



(NASA-SP-7011 (271)) AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 271, MAY 1985 (National Aeronautics and Space Administration) 121 p HC \$7.00 = CSCI 06E

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# **SPECIAL NOTICE**

## **FOREIGN TECHNOLOGY INDEX IN THIS ISSUE**

Documents referred to in this bibliography whose country of intellectual origin is other than the United States are listed in the Foreign Technology Index (see page D-1).

A great deal of excellent scientific and technical work is done throughout the world. To the extent that U.S. researchers, engineers, and industry can utilize what is done in foreign countries, we save our resources. We can thus increase our country's productivity.

We are testing out this approach by helping readers bring foreign technology into focus. We would like to know whether it is useful, and how it might be improved.

Check below, tear out, fold, staple, and return this sheet.

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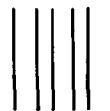
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# **AEROSPACE MEDICINE AND BIOLOGY**

## **A CONTINUING BIBLIOGRAPHY WITH INDEXES**

**(Supplement 271)**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1985 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



Scientific and Technical Information Branch  
**National Aeronautics and Space Administration**  
Washington, DC

1985

NASA SP-7011 and its supplements are available from the National Technical Information Service (NTIS). Questions on the availability of the predecessor publications, Aerospace Medicine and Biology (Volumes I - XI) should be directed to NTIS.

This supplement is available as NTISUB/123/093 from the National Technical Information Service (NTIS), Springfield, Virginia 22161 at the price of \$7.00 domestic; \$14.00 foreign.

# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 421 reports, articles and other documents announced during April 1985 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Seven indexes -- subject, personal author, corporate source, foreign technology, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1984 Supplements.

# AVAILABILITY OF CITED PUBLICATIONS

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All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies of accessions are available at \$8.50 per document. Microfiche<sup>(1)</sup> of documents announced in *IAA* are available at the rate of \$4.00 per microfiche on demand. Standing order microfiche are available at the rate of \$1.45 per microfiche for *IAA* source documents.

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**DOMESTIC:** NASA and NASA-sponsored documents and a large number of aerospace publications are available to the public for reference purposes at the library maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

**EUROPEAN:** An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England for public access. The British Library Lending Division also has available many of the non-NASA publications cited in *Star*. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols # and \* from ESA - Information Retrieval Service European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

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**NASA ACCESSION NUMBER** → **N85-11521\*** # Research Triangle Inst., Research Triangle Park, N.C. → **AVAILABLE ON MICROFICHE**

**TITLE** → **APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Final Report** → **CORPORATE SOURCE**

**AUTHORS** → **B. BASS, H. C. BEALL, J. N. BROWN, JR., W. H. CLINGMAN, R. E. EAKES, P. N. KIZAKEVICH, M. MCCARTNEY, and D. J. ROUSE** → **PUBLICATION DATE**

**REPORT NUMBER** → **Apr. 1982** 132 p (Contract NAS1-16177) → **PUBLICATION DATE**

**AVAILABILITY SOURCE** → **(NASA-CR-165872; NAS 1.26:165872)** Avail: NTIS HC A07/MF A01 CSCL 06B → **COSATI CODE**

Utilization of National Aeronautics and Space Administration (NASA) technology in medicine is discussed. The objective is best obtained by stimulation of the introduction of new or improved commercially available medical products incorporating aerospace technology. A bipolar donor/recipient model of medical technology transfer is presented to provide a basis for the team's methodology. That methodology is designed to: (1) identify medical problems and NASA technology that, in combination, constitute opportunities for successful medical products; (2) obtain the early participation of industry in the transfer process; and (3) obtain acceptance by the medical community of new medical products based on NASA technology. Two commercial transfers were completed: the Stowaway, a lightweight wheelchair that provides mobility for the disabled and elderly in the cabin of commercial aircraft, and Micromed, a portable medication infusion pump for the reliable, continuous infusion of medications such as heparin or insulin. The marketing and manufacturing factors critical to the commercialization of the lightweight walker incorporating composite materials were studied. Progress was made in the development and commercialization of each of the 18 currently active projects.

E.A.K.

## TYPICAL CITATION AND ABSTRACT FROM /AA

**NASA SPONSORED DOCUMENT** →

**AIAA ACCESSION NUMBER** → **A85-18152\*** Albert Einstein Coll. of Medicine, New York. → **TITLE**

**AUTHORS** → **MECHANISM OF COLOUR DISCRIMINATION BY A BACTERIAL SENSORY RHODOPSIN** → **TITLE**

**TITLE OF PERIODICAL** → **J. L. SPUDICH (Albert Einstein College of Medicine, Bronx, NY) and R. A. BOGOMOLNI (California, University, San Francisco, CA)** → **AUTHOR'S AFFILIATION**

→ **Nature (ISSN 0028-0836), vol. 312, Dec. 6, 1984, p. 509-513. refs** → **PUBLICATION DATE**

(Contract NIH-GM-27750; NIH-GM-27057; NSG-7151; NSF PCM-83-16139)

A photosensitive protein resembling the visual pigments of invertebrates enables phototactic archaeobacteria to distinguish color. This protein exists in two spectrally-distinct forms, one of which is a transient photoproduct of the other and each of which undergoes photochemical reactions controlling the cell's swimming behaviour. Activation of a single pigment molecule in the cell is sufficient to signal the flagellar motor. This signal-transduction mechanism makes evident a color-sensing capability inherent in the retinal/protein chromophore.

Author

# AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 271))

MAY 1985

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## LIFE SCIENCES (GENERAL)

Includes genetics.

A85-19254

AN INTERPRETATION OF THE MECHANISMS OF ELECTROPHORETIC MOBILITY VARIATIONS UNDER THE INFLUENCE OF PHYSICAL FIELDS IN A SOLID FRAMEWORK LIQUID MOSAIC ERYTHROCYTE MODEL [INTERPRETATSIYA MEKHAIZMA IZMENENII ELEKTROFORETICHESKOI PODVIZHNOSTI PRI VOZDEISTVII FIZICHESKIKH POLEI V TVERDOKARKASNOI ZHIDKOMOZAICHNOI MODELI ERITROTSITA]

V. L. SIGAL and P. V. OSADCHII (Akademiia Nauk Ukrainskoi SSR, Institut Problem Onkologii, Kiev, Ukrainian SSR) Biofizika (ISSN 0006-3029), vol. 29, Nov.-Dec. 1984, p. 974-976. In Russian. refs

A mechanism is proposed for observed variations in the electrophoretic mobility of erythrocytes due to the effects of a thermal and a microwave field. The mechanism is based on two physical effects: variation in ionic conductivity, and the visco-elastic properties of the membrane. An equation is formulated which takes into account the physical cell parameters, and the solution is compared with experimental results from the literature. I.H.

A85-19255

THE FLUORESCENT STATE OF BACTERIORHODOPSIN AND ITS ROLE IN INITIAL PHOTOPROCESSES IN PURPLE MEMBRANE AT -196 C [FLUORESTSIIRUIUSHCHEE SOSTOYANIE BAKTERIORODOPSINA I EGO UCHASTIE V PERVERNIYKH FOTOPROTSESSAKH V PURPURNYKH MEMBRANAKH PRI -196 C]

V. A. SINESHCHIKOV, S. P. BALASHOV, and F. F. LITVIN (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 29, Nov.-Dec. 1984, p. 993-997. In Russian. refs

A85-19560\*#

A HYDROPONIC METHOD FOR PLANT GROWTH IN MICROGRAVITY

B. D. WRIGHT American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 23rd, Reno, NV, Jan. 14-17, 1985. 6 p. refs

(Contract NAS10-10933)

(AIAA PAPER 85-0163)

A hydroponic apparatus under development for long-term microgravity plant growth is described. The capillary effect root environment system (CERES) is designed to keep separate the nutrient and air flows, although both must be simultaneously available to the roots. Water at a pressure slightly under air pressure is allowed to seep into a plastic depression covered by a plastic screen and a porous membrane. A root in the air on the membrane outer surface draws the moisture through it. The laboratory model has a wire-based 1.241 mm mesh polyethylene screen and a filter membrane with 0.45 micron pores, small enough to prohibit root hair penetration. The design eliminates the need to seal-off

the plant environment. Problems still needing attention include scaling up of the CERES size, controlling biofouling of the membrane, and extending the applications to plants without fibrous root systems. M.S.K.

A85-19803

MATHEMATICAL BIOPHYSICS [MATEMATICHESKAIA BIOFIZIKA]

IU. M. ROMANOVSKII, N. V. STEPANOVA, and D. S. CHERNAVSKII Moscow, Izdatel'stvo Nauka, 1984, 304 p. In Russian. refs

The basic methodologies and principles of the study of biophysical processes by numerical modelling techniques are discussed. Consideration is given to a description of numerical methods for characterizing the behavior of a biophysical system in real-time and space with respect to: the development of structure; the propagation of waves in an active medium; and the synchronization of biophysical processes. Consideration is also given to some of the following topics: biological information and the origin of life; tissue differentiation and morphogenesis; the dynamics of immune system reactions and their effects on the development of thyroid cancer; and disruptions of the cellular cycle and tissue regeneration. I.H.

A85-19807

SEARCH ACTIVITY AND ADAPTATION [POISKOVAIA AKTIVNOST' I ADAPTATSIYA]

V. S. ROTENBERG and V. V. ARSHAVSKII Moscow, Izdatel'stvo Nauka, 1984, 193 p. In Russian. refs

A new biological concept is elaborated: the idea that search activity enhances the stability of the organism against stress and various harmful effects, whereas refusal to search is an important nonspecific condition for the development of many diseases. The role of REM sleep and dreams in compensating the state of refusal to search and the recovery of search activity is shown. A new interpretation of interhemispheric asymmetry is presented, and attention is given to the special role of right-hemispheric thinking in adaptation in periods of wakefulness and sleep. New hypotheses concerning mechanisms of creativity and mechanisms of disease are examined. B.J.

A85-19808

HOMEOSTASIS OF OSSEOUS TISSUE UNDER NORMAL CONDITIONS AND IN THE CASE OF EXTREME EFFECTS [GOMEOSTAZ KOSTNOI TKANI V NORME I PRI EKSTREMAL'NOM VOZDEISTVII]

A. A. PROKHONCHUKOV, N. A. ZHIZHINA, and R. A. TIGRANIAN Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 49), 1984, 201 p. In Russian. refs

This book is concerned with the results of comprehensive studies of the homeostasis of osseous tissue. The studies were conducted with animals and human subjects, taking into account normal conditions, and extreme effects, related to such factors as space flight and an exposure to laser radiation. The state of osseous tissue under ordinary conditions is examined, giving attention to the structure and composition of calcified tissues and the characteristics of the metabolism of osseous tissue. Changes with respect to the osseous tissue in the case of a simulation of the conditions of space flight are discussed. These conditions include a restriction of motion and an exposure to ionizing and

nonionizing radiation. Alterations of the osseous tissue occurring under the conditions of space flight are also evaluated, taking into consideration experiments performed with the aid of biosatellites and investigations conducted on orbital stations. A description is provided of a general pathogenesis concerning the changes occurring in calcified tissues exposed to extreme conditions. G.R.

## A85-19809

**NYSTAGMOMETRY IN THE EVALUATION OF THE STATE OF THE VESTIBULAR FUNCTION [NISTAGMETRIIA V OTSENKE SOSTOIANIIA VESTIBULIARNOI FUNKTSII]**

M. M. LEVASHOV Leningrad, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 50), 1984, 224 p. In Russian. refs

This book is concerned with various aspects of nystagmometry, giving particular attention to cases in which the study of the nystagmus provides a means for obtaining information regarding the vestibular function and the state of the vestibular apparatus. The vestibulo-oculomotor reactions are discussed, taking into account tonic vestibulo-oculomotor reactions, rhythmic vestibulo-oculomotor reactions involving the nystagmus, the nystagmus as reaction reflecting the interaction between semicircular canals, the mechanisms of the rapid component, the extinction of the nystagmus, and nystagmography. The vestibular nystagmus and the optokinetic nystagmus are discussed along with nystagmometric approaches for increasing the amount of information provided by vestibular tests, and the diagnostic model of a bithermal test. G.R.

## A85-19816

**CLOSED MICROECOSYSTEMS - A NEW TEST-OBJECT FOR BIOPHYSICAL AND ECOLOGICAL INVESTIGATIONS [ZAMKNUTNYE MIKROEKOSISTEMY - NOVYI TEST-OB'EKTI DLIIA BIOFIZICHESKIKH I EKOLOGICHESKIKH ISSLEDOVANI]**

V. G. GUBANOV, B. G. KOVROV, and G. N. FIShteIN IN: Biophysical methods for the study of ecosystems (Biofizicheskie metody issledovaniia ekosistem). Novosibirsk, Izdatel'stvo Nauka, 1984, p. 34-44. In Russian. refs

The results of laboratory observations of biological processes in closed artificial environments are discussed. The artificial environments (microecosystems) are self-contained in glass and are capable of independent circulations and extensive growth. The living component of the environments consisted of single celled organisms which permitted a high population of organisms for the limited space of the growth chambers. A numerical simulation of biological processes within the closed systems is presented, and the results are compared with the laboratory observations. A photograph of the glass ampoules which served as the growth chambers for the artificial environments is provided. I.H.

## A85-19940

**PRINCIPLES OF THE METABOLIC CONTROL OF THE MECHANISMS OF IMMUNE HOMEOSTASIS [PRINTSIPI METABOLICHESKOGO KONTROLIA MEKHAIZMOV IMMUNNOGO GOMEOSTAZA]**

S. I. REVSKOI (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Onkologii, Leningrad, USSR) Fiziologiya Cheloveka (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 1005-1018. In Russian. refs

The paper examines possible mechanisms which mediate the effect of various types of regulatory signals on the development of immune responses to antigens, and which participate in the formation of certain immunity disturbances, termed metabolic immunodepression. Attention is given to the problem of the metabolic competition of differentiation and proliferation processes. The pathological consequences of the mechanisms described are examined in relation to aging, autoimmune diseases, and the development of cancer. B.J.

## A85-20003

**PROLONGED ELECTRICAL STIMULATION OF NEGATIVE EMOTIONOGENIC ZONES IN THE BRAIN AS A MODEL OF CHRONIC EMOTIONAL STRESS [PROLONGIROVANNIAIA ELEKTROSTIMULIATSIIA OTRITSATEL'NYKH EMOTSIOGENNYKH ZON MOZGA KAK MODEL' KHONICHESKOGO EMOTSIONAL'NOGO STRESSA]**

F. P. VEDIAEV (Khar'kovskii Gosudarstvennyi Meditsinskii Institut, Kharkov, Ukrainian SSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Sept. 1984, p. 1280-1285. In Russian. refs

In repeated experiments with rabbits and cats, the development of a conditioned eleptiform syndrome induced by prolonged electrical stimulation (five seconds at 1300 Hz) of the negative emotionogenic zones of the brain was investigated. The specific areas of the brain which received electrical stimulation were the dorsal and ventral regions of the hippocampus and the basal nucleus of the amygdaloid complex. It is shown that prolonged electrical stimulation of the negative emotiogenic zones of the limbic system can be considered as a physiological model for chronic emotional stress. I.H.

## A85-20004

**THE HYPOTHALMIC-HYPOPHYSEAL-ADRENAL SYSTEM IN THE REGULATION OF IMMUNOLOGICAL PROCESSES [GIPOTALAMO-GIPOFIZARNO-ADRENALOVAIA SISTEMA V REGULIATSII IMMUNOLOGICHESKIKH PROTSESSOV]**

E. A. KORNEVA and E. K. SHKHINEK (Akademii Meditsinskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Eksperimental'noi Meditsiny, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Sept. 1984, p. 1286-1293. In Russian. refs

A correlation is found between the level of endogenous glucocorticoid and the intensity of humoral and cellularly mediated responses under a variety of experimental conditions. It is shown that glucocorticoids may act as regulators of immune reactions by changing the physiological parameters of immune response. Antigen-induced changes in the level of cyclic nucleotides in spleen lymphocytes are found to depend on hormonal shifts. The combined roles of hormonal change intensity and the sensitivity of cell populations in determining the overall effectiveness of the immunological system is discussed, with reference to a number of experimental investigations. I.H.

## A85-20005

**INDIVIDUAL ASPECTS OF BEHAVIOR, LEARNING AND ADAPTATION IN RATS IN EXTREME CONDITIONS [INDIVIDUAL'NYE OSOBENOSTI POVEDENIIA, OBUCHENIIA I ADAPTATSII KRYSA K EKSTREMAL'NYM VOZDEISTVIAM]**

ZH. G. ALEKSANDROVA, N. B. SUVOROV, I. U. N. SHANIN, and V. N. TSYGAN (Akademii Meditsinskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Eksperimental'noi Meditsiny, Voenno-Meditsinskaia Akademiia, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Sept. 1984, p. 1294-1300. In Russian. refs

The behavioral, learning and adaptation characteristics of rats were investigated experimentally in extreme hypoxic conditions following open field and instrumental food conditioning. The animals were divided into three groups according to entropy indices obtained from the open field conditioning: a low-entropy group; a medium-entropy group; and a high-entropy group. It is found that the high-entropy group exhibited a high level of motor activity in various postures and certain behavioral states which seemed to account for the observed fast rate of food conditioning. Animals in the second and third groups (67 percent of all the animals studied) were found to be resistant to the hypoxic conditions and therefore more adaptable to extreme environments. I.H.

A85-20006

**SHIFTS IN THE SPATIAL SYNCHRONIZATION OF RABBIT CORTICAL POTENTIALS FOLLOWING APPLICATION OF NORADRENALINE TO THE VISUAL CORTEX [SDVIGI PROSTRANSTVENNOI SINKHORIZATSII POTENTSIALOV KORY KROLIKA, VYZVANNYE APPLIKATSIEI NORADRENALINA NA ZRITELNUIU OBLAST']**

N. S. KUROVA and A. I. IASTREBTSOV (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Sept. 1984, p. 1316-1322. In Russian. refs

A85-20015

**MICROHEMODYNAMIC DISTURBANCES OF THE MYOCARDIUM AND SKELETAL MUSCLE IN THE PRESENCE OF PARTIALLY RESTRICTED CORONARY BLOOD FLOW [NARUSHENIIA MIKROGEMODINAMIKI MIOKARDA I SKELETNOI MYSHTSY PRI CHASTICHNOM OGRANICHENII KORONARNOGO KROVOTOKA]**

A. S. GAVRISH and V. A. KUTS (Ukrainskii Institut Kardiologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 679-684. In Russian. refs

A85-20020

**DISTURBANCES IN CARDIOLOGICAL AND HEMODYNAMIC FUNCTION ASSOCIATED WITH CRUSH SYNDROME AND THEIR CORRECTION BY DETOXICATION [NARUSHENIIA KARDIO- I GEMODINAMIKI PRI SINDROME DLITEL'NOGO RAZDAVLIVANIIA I IKH DETOKSIKATSIONNAIA KORREKTSIIA]**

V. M. KREINES (Kemerovskii Meditsinskii Institut, Kemerovo, USSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 746-750. In Russian. refs

A85-20094

**TWISTED VORTICES IN THREE-DIMENSIONAL ACTIVE MEDIA [SKRUCHENNYE VIKHRI V TREKHMERNYKH AKTIVNYKH SREDAKH]**

A. V. PANFILOV, A. N. RUDENKO, and A. M. PERTSOV (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 279, no. 4, 1984, p. 1000-1002. In Russian. refs

A numerical experiment was carried out to investigate the characteristics of twisted (scroll wave) vortices in the form of a rotating wave with a helical surface. The conditions under which these structures can be observed experimentally in biological and chemical systems are formulated. In particular it is noted that such vortices can be observed in sufficiently thick layers of the Belousov-Zhabotinskii reaction; rotating excitation waves in heart tissue and in the cerebral cortex are examples. The appearance of such vortices is connected with a number of pathological states, including such heart-rhythm disorders as paroxysmal tachycardia and fibrillation. B.J.

A85-20177

**DETECTION OF MOLECULAR ENTITIES OF THE GENETIC CODE**

M. SHIMIZU (Tokyo, University, Tokyo, Japan) Physical Society of Japan, Journal (ISSN 0031-9015), vol. 53, Nov. 1984, p. 3755-3758. refs

The first experimental detection of C4Ns, pockets on complexes of four nucleotides (three anticodon bases and one discriminator base) which have a lock and key relationship with their cognate amino acids, is reported. Strong specificity between the C4Ns and the amino acids is demonstrated using the ultraviolet difference absorbance method. The binding constants are explicitly given. C.D.

A85-20505

**MOLECULAR ASPECTS OF EARLY DEVELOPMENT**

G. M. MALACINSKI, ED. and W. H. KLEIN, ED. (Indiana University, Bloomington, IN) New York and London, Plenum Press, 1984, 332 p. No individual items are abstracted in this volume.

Papers are presented which describe how embryos from various organisms are currently being studied with modern techniques to formulate coherent views of the manner in which gene expression is regulated in the early embryo. The topics addressed include the expression and regulation of genes, the distribution and behavior of mRNAs, protein synthesis, and others. C.D.

A85-20577

**MUTUAL EXCITATION OF DAMPED OSCILLATORS AND SELF-SUSTAINMENT OF CIRCADIAN RHYTHMS**

J. T. ENRIGHT (California, University, La Jolla, CA) IN: Mathematical models of the circadian sleep-wake cycle. New York, Raven Press, 1984, p. 1-15; Discussion, p. 15, 16. refs (Contract NSF PCM-77-19949)

Computer simulations using seven-parameter models of mutually triggering damped oscillators are employed to investigate the question whether self-sustained rhythms (such as circadian rhythms observed in vertebrate responses to light) can arise in a system comprising only damped oscillators. Results are presented graphically, and it is found that such self-sustaining oscillations can occur under appropriate conditions. The analogy to some biological examples from the literature is considered, and the implications of the findings for ecological/evolutionary explanations of the circadian-rhythm mechanism are discussed in detail. T.K.

A85-20578

**TOWARD A MATHEMATICAL MODEL OF CIRCADIAN RHYTHMICITY**

R. A. WEVER (Max-Planck-Institut fuer Psychiatrie, Andechs, West Germany) IN: Mathematical models of the circadian sleep-wake cycle. New York, Raven Press, 1984, p. 17-77; Discussion, p. 77-79. refs

On the basis of a simple differential equation, a mathematical model of the circadian rhythms of biological processes in man is presented. The differential equation is formulated to account for the simple second order oscillations of circadian rhythms under a variety of external conditions. The steady state solutions to the model equations are given in the form of phase response curves. In a comparison with experimental observations of circadian rhythms of biological processes, the obtained results are found to be highly accurate. I.H.

A85-20655

**THE EFFECT OF HYDRAZINE ON REPRODUCTIVE FUNCTION IN ANIMALS FOR DIFFERENT WAYS OF INTAKE INTO THE ORGANISM [VLIANIE GIDRAZINA NA GENERATIVNUIU FUNKTSIU ZHIVOTNYKH PRI RAZLICHNYKH PUTIAKH POSTUPLENIIA V ORGANIZM]**

V. V. DYMIN, V. L. DENISOV, S. N. ANDROPOVA, and V. P. MALETIN (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Gigiena i Sanitariia (ISSN 0016-9900), Sept. 1984, p. 25-28. In Russian. refs

It is found through a series of experimental investigations with rats that long-term exposure to hydrazine has a detrimental effect on reproductive function. The major embryotoxic, gonadotoxic, and mutagenic effects of the chemical are correlated with doses and concentrations comparable to the maximum allowable concentrations of hydrazine in water and air in the work environment. The findings indicate potentially significant long-term health hazards as a result of long term exposure. The full experimental data are given in a series of tables. I.H.

A85-20663

**POTENTIOMETRIC METHOD FOR DETERMINING POTASSIUM AND SODIUM ION CONCENTRATION IN THE BLOOD PLASMA AND SERUM USING ION-SELECTIVE ELECTRODES [POTENTSIOMETRICHESKII METOD OPREDELENIIA KONTSENTRATSII IONOV KALIIA I NATRIIA V PLAZME I SYVOROTKE KROVI S POMOSHCHIU ION-SELEKTIVNYKH ELEKTRODOV]**

B. A. DOBROLIOBOVA Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1984, p. 68, 69. In Russian. refs

A85-20664

**EFFECT OF INFRASOUND ON THE TRACE-ELEMENT METABOLISM IN THE BODY [VLIANIE INFRASHUMOV NA OBMEN MIKROELEMENTOV V ORGANIZME]**

I. I. SHVAIKO, I. P. KOZIARIN, I. A. MIKHAIUK, and I. N. MOTUZKOV (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), Sept. 1984, p. 91, 92. In Russian. refs

Experiments were performed on white rats in order to assess the prolonged effect of infrasound of different intensities (90, 115, and 135 dB) on the metabolism of biologically active trace elements: copper, molybdenum, iron, and manganese. It is concluded that variations in the metabolism of these elements play a definite role in adaptive-compensatory responses of the body to infrasound, and are connected with disturbances of the functional condition of the central nervous and sympathoadrenal systems, and with an elevated concentration of catecholamines in the blood. B.J.

A85-20668

**A CALORIMETRIC INVESTIGATION OF G-ACTIN DENATURATION [KALORIMETRICHESKOE ISSLEDOVANIE DENATURATSII G-AKTINA]**

L. V. TATUNASHVILI and P. L. PRIVALOV (Akademiia Nauk SSSR, Institut Belka, Pushchino, USSR) Biofizika (ISSN 0006-3029), vol. 29, no. 4, 1984, p. 583-585. In Russian. refs

A85-20669

**A NONMONOTONIC PATTERN OF TEMPERATURE CHANGES IN THE CONFORMATION OF PROTEIN IN THE PREDENATURATION TEMPERATURE REGION [NEMONOTONNYI KHARAKTER TEMPERATURNYKH IZMENENII KONFORMATSII BELKOV V PREDENATURATSIONNOI OBLASTI TEMPERATUR]**

A. P. ZHUKOVSKII, N. V. ROVNOV, and A. I. KHALOIMOV (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) Biofizika (ISSN 0006-3029), vol. 29, no. 4, 1984, p. 586-589. In Russian. refs

A85-20670

**A MATHEMATICAL MODEL OF FLUID TRANSPORT IN THE PROXIMAL CONVOLUTION TUBULE AND CAPILLARIES OF THE KIDNEYS [MATEMATICHESKAIA MODEL' TRANSPORTA ZHIKOSTI V IZVITOI CHASTI PROKSIMAL'NOGO KANAL'TSA POCHEK I OKRUZHAIUSHCHIKH KAPILLIARAKH]**

IU. IA. KISLIAKOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Biofizika (ISSN 0006-3029), vol. 29, no. 4, 1984, p. 676-680. In Russian. refs

A85-20671

**BIOPHYSICAL ASPECTS OF THE EFFECT OF PHYSICAL AND CHEMICAL FACTORS ON LIVING ORGANISMS - THE DEFENSIVE PROPERTIES OF ANTIOXIDANTS [BIOFIZICHESKIE ASPEKTY DEISTVIA FIZICHESKIKH I KHIMICHESKIKH FAKTOROV NA ZHIVYE ORGANIZMY - ZASHCHITNYE SVOISTVA ANTIKSIDANTOV]**

N. M. EMANUEL (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 29, no. 4, 1984, p. 706-719. In Russian. refs

The biophysical changes in living organisms due to physical and chemical processes in the natural environment are discussed. Emphasis is given to the free-radical changes induced by ionizing

radiation, light, thermal agents and toxic chemical substances. The application of such observational techniques as EPR, NMR, and electron microscopy to environmental monitoring is considered. On the basis of an analysis of data from the literature, it is shown that natural and synthetic antioxidants inhibit free-radical processes in living organisms and work to prevent and correct damage caused by physical and chemical factors in the natural environment. I.H.

A85-20682

**TREND OF HORMONAL SHIFTS IN ACUTE STRESS REACTION IN MONKEYS WITH DIFFERENT REACTIVITIES [NAPRAVLENNOST' GORMONAL'NYKH SDVIGOV PRI OSTROI STRESSOVOI REAKTSII U OBEZ'IAN S RAZLICHNOI REAKTIVNOST'IU]**

G. S. BELKANIIA, V. I. VORONTSOV, and N. N. ZDANKEVICH (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Patologii i Terapii, Sukhumi, Georgian SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), July-Aug. 1984, p. 52-57. In Russian. refs

Stress-resistant, moderately reactive, and stress-reactive rhesus monkeys were distinguished according to the degree of cardiopathogenic reactivity (CR). An experimental study shows that exposure to an acute stress effect is not accompanied by a marked increase in the blood cortisol content of stress-resistant animals, while the gonadal function (according to the testosterone content) is greatly inhibited. An increase in CR is paralleled by a larger increase in the glucocorticoid reaction and a less marked inhibition of the testicular hormonal function. It is concluded that the adaptational trend of the hormonal reaction corresponds to the degree of the cardiopathogenic manifestations of acute stress. B.J.

A85-20683

**CONTRIBUTION OF LYSOSOMES TO RECOVERY PROCESSES IN THE LIVER AFTER PHYSICAL EXERCISE [UCHASTIE LIZOSOM V VOSSTANOVITEL'NYKH PROTSYSSAKH V PECHENI POSLE FIZICHESKOI NAGRUZKI]**

N. N. MAIANSKAIA, L. E. PANIN, and T. G. FILATOVA (Akademiia Meditsinskikh Nauk SSSR, Institut Klinicheskoi i Eksperimental'noi Meditsiny, Novosibirsk, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), July-Aug. 1984, p. 65-70. In Russian. refs

Experiments performed on white male Wistar rats show that, in the restoration period after intensive physical exercise, the activity of glucose-6-phosphate dehydrogenase (G-6-PDH) in the liver increases significantly along with an increase in the total fraction of the low and very low density lipoproteins (LP), which is connected with their intensified synthesis. The induction of G-6-PDH and LP synthesis was preceded by transitory activation of lysosomes in the hepatocytes and their translocation toward the nucleus. An increase in the G-6-PDH activity and LP content in the rat liver was prevented by the blocking of lysosome translocation with vinblastin or colchicine as well as the inhibition of lysosome proteolytic activity with gordon or contrykal. B.J.

A85-20687

**TISSUE HOMEOSTASIS AND ITS MECHANISMS [TKANEVYI GOMEOSTAZ I EGO MEKHANIZMY]**

V. P. MIKHAILOV and G. S. KATINAS Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 87, Sept. 1984, p. 5-13. In Russian. refs

A85-20689

**ULTRASTRUCTURAL CHARACTERISTICS OF THE STROMAL MECHANOCYTES AND THEIR INTERACTIONS WITH HEMOPOIETIC CELLS IN REGENERATING GRAFTS OF BONE MARROW [UL'TRASTRUKTURNAIA KHARAKTERISTIKA STROMAL'NYKH MEKHANOTSITOV I IKH VZAIMODEISTVIA S KROVETVORNymi KLETKAMI V REGENERIRUIUSHCHIKH TRANSPLANTATAKH KOSTNOGO MOZGA]**

V. I. STAROSTIN and G. P. SATDYKOVA (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 87, Sept. 1984, p. 41-47. In Russian. refs

A85-20691

**PHOTON ABSORPTIOMETRY - METHOD FOR THE PRECISE IN VIVO DETERMINATION OF BONE MINERALS [FOTONNAIA ABSORBTIOMETRIIA - METOD TOCHNOGO PRIZHIZNENNOGO OPREDELENIIA MINERALOV KOSTI]**

A. A. SVESHNIKOV (Kurganskii Nauchno-Issledovatel'skii Institut Eksperimental'noi i Klinicheskoi Ortopedii i Travmatologii, Kurgan, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 87, Sept. 1984, p. 87-90. In Russian. refs

A85-20692

**ALTERATIONS IN THE CONTENT OF PHOSPHOLIPIDS, BLOOD SUGAR, AND BLOOD COAGULATION DURING LONG-TERM COOLING [IZMENENIE SODERZHANIIA FASFOLIPIDOV, SAKHARA KROVI I GEMOKOAGULIATSII PRI DLITEL'NOM OKHLAZHDENII]**

A. I. ZHIKHAREVA, S. I. TAZHUDINOVA, and I. V. GRACHEVA (Tiumenskii Meditsinskii Institut, Tyumen, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 30, July-Aug. 1984, p. 20-22. In Russian. refs

A85-20693

**PARTICIPATION OF THE KIDNEYS IN ALTERATIONS OF THE FIBRINOLYSIS SYSTEM UNDER ELECTROSHOCK [UCHASTIE POCHEK V IZMENENIIAKH SISTEMY FIBRINOLIZA PRI ELEKTROSHOKE]**

G. V. ANDREENKO and L. V. PODOROLSKAIA (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 30, July-Aug. 1984, p. 39-42. In Russian. refs

A85-20694

**PHYSIOLOGICAL-BIOCHEMICAL CORRELATES OF BEHAVIORAL RESPONSES IN CATS UNDER EMOTIONAL STRESS [FIZIOLOGO-BIOKHIMICHESKIE KORRELIATY POVEDENCHESKIKH REAKTSII U KOSHEK V USLOVIAKH EMOTSIONAL'NOGO STRESSA]**

P. S. KHOMULO and N. L. GRITSKEVICH (Leningradskii Sanitar'no-Gigienicheskii Meditsinskii Institut, Leningrad, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 30, July-Aug. 1984, p. 53-55. In Russian. refs

A85-20695

**BIOCHEMICAL ASSESSMENT OF INDIVIDUAL SENSITIVITY TO OXYGEN TOXICITY IN RABBITS [BIOKHIMICHESKAIA OTSENKA INDIVIDUAL'NOI CHUVSTVITEL'NOSTI K KISLORODNOI INTOKSIKATSII U KROLIKOV]**

A. I. LUKASH, V. V. VNUKOV, and S. I. DUDKIN (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 30, July-Aug. 1984, p. 60-64. In Russian. refs

An experimental study was conducted to establish a correlation between the prooxidant activity in the blood, determined on the basis of chemiluminescence in the H<sub>2</sub>O<sub>2</sub>-luminol-blood plasma system, and the individual sensitivity of rabbits to oxygen toxicity. Alterations in blood prooxidant activity, as shown by the treatment of the blood sample with oxygen at 0.7 MPa pressure in vitro, were found to correlate clearly with a period of convulsions as well as with the viability of the rabbits during acute hyperoxia.

B.J.

A85-20697

**ROLE OF INTERCELLULAR INTERACTIONS IN THE REGULATION OF ERYTHROPOIESIS [O ROLI MEZHKLETOCHNYKH VZAIMODEISTVII V REGULIATSII ERITROPOEZA]**

IU. M. ZAKHAROV and I. IU. MELNIKOV (Cheliabinskii Gosudarstvennyi Meditsinskii Institut, Chelyabinsk, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 98, July-Aug. 1984, p. 60-72. In Russian. refs

Data are presented on the significance of stromal elements of bone marrow in producing the microenvironment which regulates erythropoiesis. It is demonstrated that macrophages have the capacity to regulate the proliferation of precursor cells of the erythroid line by the production of special humoral factors, as well as the differentiation of erythroid cells in erythroblastic islands. Attention is given to the place of hemopoietic intercellular interactions in the overall system of erythropoiesis regulation.

B.J.

A85-20698

**MECHANISMS OF TOLERANCE TO XENOBIOTICS [MEKHANIZMY TOLERANTNOSTI K KSENOBIOTIKAM]**

S. S. KRYLOV (Ministerstvo Zdravookhraneniia SSSR, Institut Toksikologii, Leningrad, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 98, July-Aug. 1984, p. 90-102. In Russian. refs

A number of topics are discussed, including the main features in the development of tolerance to xenobiotics, the significance of cross tolerance in experimental pharmacology, and the possibility of transferring tolerance to intact animals from tolerant individuals of the same (or another) species. Acute tolerance and tachyphylaxis are compared, and it is hypothesized that the humoral factor is the sole mechanism underlying the appearance of tolerance. Also considered is the interrelationship between tolerance and psychological and physical dependence on sleeping pills, tranquilizers, alcohol, narcotic analgesics, and other xenobiotics.

B.J.

A85-20699

**MEDIATORS OF THE INTERACTION OF THE NEUROENDOCRINE AND IMMUNE SYSTEMS [MEDIATORY VZAIMODEISTVIA NEUROENDOKRINNOI I IMMUNNOI SISTEMY]**

L. A. ZAKHAROVA (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) and A. M. VASILENKO (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Institut Refleksoterapii, Moscow, USSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 98, July-Aug. 1984, p. 103-115. In Russian. refs

Three basic mechanisms for the neuroendocrine modulation of immune processes are identified: catecholamine, glucocorticoid, and endorphin. All three are mainly directed toward the regulation of the T-system of immunity and have a common final unit: a system of cyclic monophosphates. These groups of mediators affect different T-cell subpopulations and display a definite specialization in immune-process modulation. Tymosin, leukocytic interferon, and a medullar stimulator of antibody procedures are considered as mediators providing for the transmission of information from the immune to the nervous system.

B.J.

A85-20700

**THE PROBLEM OF NEUROENDOCRINE CELLS AND THE HYPOTHESIS OF THE DIFFUSE ENDOCRINE SYSTEM [PROBLEMA NEUROENDOKRINNYKH KLETOK I GIPOTEZY 'DIFFUZNOI ENDOKRINNOI SISTEMY']**

B. V. ALESHIN (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Kharkovskii Nauchno-Issledovatel'skii Institut Endokrinologii i Khimii Gormonov, Kharkov, Ukrainian SSR) Uspekhi Sovremennoi Biologii (ISSN 0042-1324), vol. 98, July-Aug. 1984, p. 116-133. In Russian. refs

A85-20708

**THE DYNAMICS OF STEROID HORMONES UNDER ADAPTATION TO COLD IN DIFFERENT INBRED LINES OF RATS [DINAMIKA STEROIDNYKH GORMONOV PRI ADAPTATSII K KHOLODU U KRYIS RAZNYKH INBREDNYKH LINII]**

L. A. GERLINSKAIA and M. P. MOSHKIN (Akademiia Nauk SSSR, Biologicheskii Institut, Novosibirsk, USSR) Problemy Endokrinologii, vol. 30, July-Aug. 1984, p. 63-66. In Russian. refs

A85-20725

**BIOELECTRIC MECHANISMS FOR THE FIBRILLATION OF THE VENTRICLES DURING CORONARY OCCLUSION [BIOELEKTRICHESKIE MEKHANIZMY FIBRILLIATSII ZHELUDOKHOV PRI NARUSHENII KORONARNOGO KROVOOBRASHCHENIIA]**

M. E. RAISKINA and B. N. FELD (Akademiia Meditsinskikh Nauk SSSR, Vsesoiuznyi Kardiologicheskii Nauchnyi Tsentr, Moscow, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 15, July-Sept. 1984, p. 108-134. In Russian. refs

Variations of the bioelectric properties of the heart were studied in anesthetized dogs and cats with coronary occlusion, complicated by ventricular fibrillation. Cases with fibrillation were characterized by pronounced changes facilitating excitation circulation. Conditions for the appearance and maintenance of excitation circulation in the case of local ischemia are investigated by a mathematical model and electrophysiological experiments. It is shown that the termination of excitation circulation leads to a reduction in the degree of relaxation (a generalized characteristic of the action potential). B.J.

A85-20733

**NOURISHMENT AND THE FORMATION OF THE ORGANIC MATRIX OF BONE TISSUE [PITANIE I FORMIROVANIE ORGANICHESKOGO MATRIKSA KOSTNOI TKANI]**

V. I. SMOLIAR (Nauchno-Issledovatel'skii Institut Gigieny Pitaniia, Kiev, Ukrainian SSR) Voprosy Pitaniia (ISSN 0042-8833), July-Aug. 1984, p. 3-7. In Russian. refs

Recent literature on nourishment and the formation of the organic matrix of bone tissue is reviewed. It is suggested that, contrary to the widespread view that collagen is metabolically inert, its metabolism in bone tissue is quite intense and depends significantly on the components of the diet. An unbalanced diet has a negative effect not only on the biosynthesis of collagen proteins inside osteogenic cells, but also on the formation of supermolecular collagen structures, which is expressed in a delay in the development of transverse covalent bonds. This unbalance also leads to a disruption in the harmony between the development of collagen structures and protein-polysaccharide complexes. B.J.

A85-20735

**PARADOXES OF THE LIVER [PARADOKSY PECHENI]**

A. F. BLIUGER Khimiia i Zhizn' (ISSN 0130-5972), Aug. 1984, p. 23-29. In Russian.

The nature and functions of the liver are examined. Particular attention is given to the hepatic removal of xenobiotics, the biotransformations of drugs in the liver, and the speed with which the liver functions. The Botkin and Gilbert syndromes are discussed. B.J.

A85-20737

**MITOTIC ACTIVITY OF MYELOCARYOCYTES UNDER MICROWAVE IRRADIATION (2375 MHZ) [MITOTICHESKAIA AKTIVNOST' MIELOKARIOTSITOV PRI MIKROVOLNOVOM OBLUCHENII /2375 MGTS/]**

E. I. OBUKHAN (Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR) Tsitologiya i Genetika (ISSN 0041-4883), vol. 18, July-Aug. 1984, p. 264-267. In Russian. refs

Rats were exposed to low-intensity microwave radiation (10, 50, and 500 microwatts/sq cm) at 2375 MHz for a period of a

month in order to assess the radiation effects on the mitotic activity (MA) of myelocaryocytes. The MA was found to vary within the circadian-rhythm cycle; effects on DNA synthesis, premitotic processes, and cell reproduction biorhythms were noted depending on radiation intensity. B.J.

A85-20835

**THE INTERCONNECTION BETWEEN HYPOTHALAMIC-HYPOPHYSEAL-ADRENAL AND SYMPATHOADRENAL SYSTEMS IN THE INITIAL STAGE OF THE POSTTRAUMATIC RESPONSE [VZAIMOSVIAZ' GIPOTALAMO-GIPOFIZARNO-NADPOCHECHNIKOVOI I SIMPATIKO-ADRENALOVOI SISTEM V RANNEM PERIODE FORMIROVANIIA POSTTRAVMATICHESKOI REAKTSII]**

L. T. LYSYI (Kishinevskii Meditsinskii Institut, Kishinev, Moldavian SSR) Patologicheskaiia Fiziologiya i Eksperimental'naia Terapiia (ISSN 0031-2991), no. 6, Nov.-Dec. 1984, p. 15-18. In Russian. refs

The different reactions of the hypothalamic and sympathoadrenal systems to trauma are investigated experimentally in rats. Trauma was induced by the application of pressure to the soft tissue of the posterior region. It is shown that the early stage of posttraumatic response is characterized by rapid increase in the activity of the hypothalamic region of the sympathoadrenal system. The response of the adrenals by epinephrine and norepinephrine secretions is found to be delayed and less pronounced. When hypothalamic and sympathoadrenal functions finally stabilized 1-4 hours following trauma, parallelism was observed in the variations of catecholamine and cholinesterase levels in the hypothalamus and the adrenals. I.H.

A85-20837

**CHANGES IN EXTERNAL RESPIRATION AND GAS EXCHANGE INDICES IN CATS WITH HYPERTHERMIA [IZMENENIIA POKAZATELEI VNESHNEGO DYKHANIIA I GAZOOMBENA U KOSHEK PRI GIPERTERMII]**

V. A. TASHLIEV and D. P. DVORETSKII (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Meditsiny, Leningrad, USSR) Patologicheskaiia Fiziologiya i Eksperimental'naia Terapiia (ISSN 0031-2991), no. 6, Nov.-Dec. 1984, p. 62-65. In Russian. refs

A85-20838

**THE EFFECT OF HYPERBARIC OXYGENATION ON OXYGEN TENSION, CEREBRAL BLOOD FLOW, AND RESPIRATORY-ENZYME ACTIVITY IN THE CEREBRAL HEMISPHERES AND BRAIN STEM AS A RESULT OF ISCHEMIA [VLIANIE GIPERBARICHESKOI OKSIGENATSII NA NAPRIAZHENIE KISLORODA, MOZGOVOI KROVOTOK I AKTIVNOST' DYKHATEL'NYKH FERMENTOV V BOL'SHIKH POLUSHARIIAKH I STVOLE GOLOVNOGO MOZGA PRI ISHEMII]**

L. A. NOVIKOVA and A. N. LEONOV (Voronezhskii Meditsinskii Institut, Voronezh, USSR) Patologicheskaiia Fiziologiya i Eksperimental'naia Terapiia (ISSN 0031-2991), no. 6, Nov.-Dec. 1984, p. 69-72. In Russian. refs

A85-20839

**THE DEPENDENCE OF ERYTHRON REACTION ON THE INTENSITY AND DURATION OF THE EFFECT OF A CONSTANT MAGNETIC FIELD [ZAVISIMOST' REAKTSII ERITRONA OT NAPRIAZHENOSTI I DLITEL'NOSTI VOZDEISTVIIA POSTOIANNOGO MAGNITNOGO POLIA]**

S. A. GREBENNIKOV and A. D. PAVLOV (Riazanskii Meditsinskii Institut, Riazan, USSR) Patologicheskaiia Fiziologiya i Eksperimental'naia Terapiia (ISSN 0031-2991), no. 6, Nov.-Dec. 1984, p. 72-75. In Russian. refs



**A85-21116\*** Louisville Univ., Ky.

**FATIGUE AND CONTRACTION OF SLOW AND FAST MUSCLES IN HYPOKINETIC/HYPODYNAMIC RATS**

R. D. FELL, L. B. GLADDEN, J. M. STEFFEN, and X. J. MUSACCHIA (Louisville, University, Louisville, KY) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 65-69. refs

(Contract NSG-2325)

The effects of hypokinesia/hypodynamia (H/H) on the fatigability and contractile properties of the rat soleus (S) and gastrocnemius (G) muscles have been investigated experimentally. Whole body suspension for one week was used to induce H/H, and fatigue was brought on by train stimulation for periods of 45 and 16 minutes. Following stimulation, rapid rates of fatigue were observed in the G-muscles of the suspended rats, while minimal fatigue was observed in the S-muscles. The twitch and tetanic contractile properties of the muscles were measured before and after train stimulation. It is found that H/H suspension increased twitch tension in the G-muscles, but did not change any contractile properties in the S-muscles. The peak twitch, train, tetanic tensions and time to peak were unchanged in the S-muscles of the suspended rats. On the basis of the experimental results, it is concluded that 1 wk of muscle atrophy induced by H/H significantly increases fatigability in G-muscles, but does not affect the contractile properties of fast-twitch and slow-twitch muscles. I.H.

**A85-21120**

**REGIONAL LUNG STRAIN IN DOGS DURING DEFLATION FROM TOTAL LUNG CAPACITY**

J. R. RODARTE, R. D. HUBMAYR, B. J. WALTERS (Mayo Clinic; Mayo Foundation, Rochester, MN), and D. STAMENOVIC (Harvard University, Boston, MA; Mayo Clinic; Mayo Foundation, Rochester, MN) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 164-172. Research supported by the Digital Equipment Corp. refs

(Contract NIH-HL-21584; NIH-HL-4664; NIH-HL-7222)

**A85-21121**

**COLLATERAL VENTILATION DURING HIGH-FREQUENCY OSCILLATION IN DOGS**

J. ARMENGOL, R. L. JONES, and E. G. KING (Alberta, University, Edmonton, Canada) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 173-179. Research supported by the Alberta Heritage Foundation for Medical Research. refs

**A85-21124**

**LOW P 50 IN DEER MICE NATIVE TO HIGH ALTITUDE**

L. R. G. SNYDER (California, University, Riverside; White Mountain Research Station, Bishop, CA) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 193-199. Research supported by the University of California and White Mountain Research Station. refs

(Contract NSF DEB-81-04699; NSF DEB-82-82708;

NIH-RR-07010-13)

In vivo measurements have been obtained of partial pressure at 50 percent hemoglobin saturation (P-50) in deer mice, in order to determine the adaptive response to high-altitude hypoxia. The mice were native to a range of altitudes, but were acclimated for extended periods to altitudes of 340, and 3400 m, respectively. Measurements of CO<sub>2</sub> partial pressure, and variations in CO<sub>2</sub> partial pressure with pH, were also obtained. It is shown that the variation in P-50 between altitudes was minimal, due to counterbalancing changes in CO<sub>2</sub> partial pressures and 2,3-diphospho-D-glycerate concentrations. At both altitudes a decrease was observed in P-50 values in native animals. Substantial agreement was found between the in vivo measurements and theoretical predictions. I.H.

**A85-21125**

**EFFECT OF COLD EXPOSURE ON LIVER AND MUSCLE CAMP CONTENT AND CAMP PHOSPHODIESTERASE ACTIVITY**

W. K. PALMER, T. A. KANE, F. BACH, and S. DOUKAS (Illinois, University, Chicago, IL) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 211-216. Research supported by the Chicago Heart Association. refs

(Contract NIH-HL-26435)

The effect of cold upon cAMP levels and PDE activity in the skeletal, heart, and liver tissues of rats has been determined experimentally. The animals were exposed to cool-room temperatures of 2 C for periods ranging from 1 to 7 days. Procedures used in the preparation of the tissue samples are described. cAMP was assayed using the protein kinase-binding assay of Brostrom and Kon (1974), and PDE activity was measured in supernatant and particulate fractions of tissue homogenized in 50 mM tris-(hydroxymethyl) aminomethane (pH 7.4), 5 mM MgCl<sub>2</sub>. It is found that: (1) cAMP concentration increased in fast-twitch red muscle at the same time that PDE activity decreased; (2) PDE activity of fast-twitch white muscle was elevated 50 percent after 1 and 3 days of cold exposure, but returned to normal levels by the 5th day of exposure. Hepatic cAMP and PDE activity were elevated over normal at all times. On the basis of the above data it is suggested that changes in cAMP metabolism play a role in attaining homeostasis during acute cold exposure. I.H.

**A85-21373**

**INTRINSIC MECHANISMS OF PAIN INHIBITION - ACTIVATION BY STRESS**

J. W. LEWIS (Michigan, University, Ann Arbor, MI), J. T. CANNON (Scranton, University, Scranton, PA), J. C. LIEBESKIND (California, University, Los Angeles, CA), G. W. TERMAN, and Y. SHAVIT (Science (ISSN 0036-8075), vol. 226, Dec. 14, 1984, p. 1270-1277. Research supported by the Brotman Foundation. refs

(Contract NIH-NS-07628)

Portions of the brain stem seem normally to inhibit pain. In man and laboratory animals these brain areas and pathways from them to spinal sensory circuits can be activated by focal stimulation. Endogenous opioids appear to be implicated although separate nonopioid mechanisms are also evident. Stress seems to be a natural stimulus triggering pain suppression. Properties of electric footshock have been shown to determine the opioid or nonopioid basis of stress-induced analgesia. Two different opioid systems can be activated by different footshock paradigms. This dissection of stress analgesia has begun to integrate divergent findings concerning pain inhibition and also to account for some of the variance that has obscured the reliable measurement of the effects of stress on tumor growth and immune function. Author

**A85-21537\*** Salk Institute for Biological Studies, San Diego, Calif.

**NON-ENZYMATIC TEMPLATE-DIRECTED SYNTHESIS ON RNA RANDOM COPOLYMERS - POLY(C, U) TEMPLATES**

G. F. JOYCE, T. INOUE, and L. E. ORGEL (Salk Institute for Biological Studies, San Diego, CA) *Journal of Molecular Biology* (ISSN 0022-2836), vol. 176, 1984, p. 279-306. refs

(Contract NIH-GM-13435; NIH-GM-07198; NGR-05-067-001)

Random copolymer templates containing cytosine and uracil in ratios of 3:1 and 1:1 are used to explore the optimum conditions for efficient synthesis of guanine and adenine-containing oligonucleotides. The experimental procedure is described, including the preparation of mononucleoside 5'-phospho-2-methylimidazolides and random copolymers, the template-directed oligomerization, the removal and reintroduction of mononucleotides in interrupted reactions, the determination of oligomerization efficiency, the alkaline and enzymatic hydrolysis of reaction products, and the column chromatography. Results are presented and discussed for the dependence of adenine incorporation on the formation of short oligo(G)s, optimization of incorporation efficiencies by adjusting monomer concentrations, the characterization of oligomeric product distribution, and the regiospecificity of adenine incorporation. The prebiotic significance of the results is assessed. C.D.

**A85-21538\*** Salk Institute for Biological Studies, San Diego, Calif.

**TEMPLATE-DIRECTED SYNTHESIS ON THE PENTANUCLEOTIDE CPCPGPCPC**

T. INOUE, G. F. JOYCE, K. GRZESKOWIAK, L. E. ORGEL (Salk Institute for Biological Studies, San Diego, CA), J. M. BROWN, and C. B. REESE (King's College, London, England) *Journal of Molecular Biology* (ISSN 0022-2836), vol. 178, 1984, p. 669-676. refs

(Contract NIH-GM-13435; NGR-05-067-001)

Experiments in which CpCpGpCpC is used as a template to facilitate the co-oligomerization of 2-MelmpG and 2-MelmpC are described. It is shown that 3' to 5' prime-linked pGpGpCpGpG, whose sequence is complementary to that of the template, is substantially the most abundant pentameric product of the template-directed reaction. The yield of pGpGpCpGpG is never large (less than 20 percent), presumably because off-template reactions consume template-directed products. Thus pGpGpCpGpG is converted to the various isomers of G5C and G4C2 by off-template terminal addition of G or C. The 3' to 5' isomer of GpG is elongated on the template to give GpGpC, GpGpCpG, and GpGpCpGpG, while the 2' to 5' isomer does not initiate the synthesis of detectable amounts of longer oligomers.

M.D.

**A85-21539\*** Maryland Univ., Baltimore.

**INCREASED CYTOSOLIC ANDROGEN RECEPTOR BINDING IN RAT STRIATED MUSCLE FOLLOWING DENERVATION AND DISUSE**

P. A. BERNARD, P. S. FISHMAN, S. R. MAX (Maryland, University; U.S. Veterans Administration, Medical Center, Baltimore, MD), and N. E. RANCE (Johns Hopkins University; Maryland, University; U.S. Veterans Administration, Medical Center, Baltimore, MD) *Journal of Neurochemistry* (ISSN 0022-3042), vol. 43, no. 5, 1984, p. 1479-1483. Research supported by the U.S. Veterans Administration and University of Maryland. refs  
(Contract NIH-NS-15760; NIH-NS-20022; NAG2-100)

The effects of denervation and disuse on cytosolic androgen receptor binding by rat striated muscle are investigated. Denervation of the extensor digitorum longus and tibialis anterior muscles caused by a 40-50-percent increase in cytosolic androgen receptor concentration with no change in apparent binding affinity. This effect was evident at 6 h postdenervation, maximal at 24 h, and declined to 120 percent of the control level 72 h after denervation. A 40-percent increase in cytosolic androgen receptor concentration was also noted 24 hr after denervation of the hormone-sensitive levator ani muscle. The effect of denervation on androgen receptors was blocked by in vivo injection of cycloheximide; therefore, de novo receptor synthesis probably is not involved in the observed increase. Disuse, produced by subperineurial injection of tetrodotoxin into the tibial and common peroneal branches of the sciatic nerve, mimicked the effect of denervation on androgen receptor binding, suggesting that neuromuscular activity is important in regulation of receptor concentration. Possible mechanisms subserving this effect are discussed.

Author

**A85-21543\*** Johns Hopkins Univ., Baltimore, Md.

**MODULATION OF THE CYTOSOLIC ANDROGEN RECEPTOR IN STRIATED MUSCLE BY SEX STEROIDS**

N. E. RANCE (Johns Hopkins University; Maryland, University, Baltimore, MD) and S. R. MAX (Maryland, University, Baltimore, MD) *Endocrinology* (ISSN 0013-7227), vol. 115, no. 3, 1984, p. 862-866. Research supported by the University of Maryland. refs

(Contract NAG2-100; NIH-NS-15760; NIH-NS-15766)

The effects of orchiectomy (GDX) and of subsequent administration of testosterone propionate (TP) or 17(beta)-estradiol (E2) on the maximum binding (Bmax) and apparent Kd of the cytosolic androgen receptor in levator ani (LA) and skeletal muscles of adult male Sprague-Dawley rats are investigated experimentally. The results are presented in graphs and discussed. In LA, BMAX is found to rise from a control level of 2.5 fmol/mg protein to 280, 600, 478, and 133 percent of control at 12 h, 14 d, 30 d,

and 44 d after GDX, respectively, while Kd increased only insignificantly (from 680 to 960 fM); Bmax is held at control levels for 6 h by cycloheximide given at GDX, is unaffected by TP given at 30 d, and is further increased (by 480 percent at 44 d) by administration of E2 at 30 d. Bmax in skeletal muscles is found to increase to 139, 212, 220, and 158 percent of control at 12 h, 14 d, 30 d, and 44 d, respectively; Bmax is returned to control at 44 d by TP at 30 d but is not affected by E2. The effect of E2 in LA is attributed to either induction of the cytosolic receptor or a decreased rate of receptor degradation.

T.K.

**A85-21972\*** Massachusetts Inst. of Tech., Cambridge.

**RADIAL MAZE PERFORMANCE IN THREE STRAINS OF MICE - ROLE OF THE FIMBRIA/FORNIX**

D. K. REINSTEIN, T. DEBOISSIERE, N. ROBINSON, and R. J. WURTMAN (MIT, Cambridge, MA) *Brain Research* (ISSN 0006-8993), vol. 263, 1983, p. 172-176. refs  
(Contract NIH-MH-28783; NGR-22-009-627)

Three strains of mice were tested on an 8-arm radial maze, an index of hippocampus-dependent spatial memory. Levels of performance differed between strains with C57Br/cdj greater than Balb/cj greater than C57B1/6j. Lesions of the fimbria/fornix disrupted performance in the C57Br and Balb strains; the C57B1 mice never performed better than chance before or after surgery. Choline acetyltransferase activity in hippocampus was not correlated with radial maze performance. These findings suggest a possible genetic contribution towards radial maze behavior.

Author

**A85-22119**

**THE DYNAMICS OF CHANGES IN THE FUNCTIONAL STATE OF NEURONS IN THE CENTRAL NERVOUS SYSTEM IN RESPONSE TO LONG-TERM STIMULATION [DINAMIKA IZMENENII FUNKSIONAL'NOGO SOSTOIANIIA NEIRONOV TSENTRAL'NOI NERVNOI SISTEMY PRI DLITEL'NYKH RAZDRAZHENIIAKH]**

I. N. IANVAREVA, A. G. KOPYLOV, T. R. KUZMINA, and A. I. VISLOBOKOV (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 70, Oct. 1984, p. 1394-1401. In Russian. refs

The mechanisms of long term stimulation of neurons in the central nervous system were studied in animals of different structural complexity (molluscs and cats). Long term stimulation was induced by hypoxia and prolonged transmembrane polarization of a single neuron. The electrophysiological characteristics of the neurons were determined by potential fixation, intracellular dialysis, and a microelectrode technique. It is found that hypoxia transformed the neuron specimens from a state of excitation into a state of depolarized inhibition; neuron reaction was associated with a primary activation followed by a slow inactivation of the channels of input current.

I.H.

**A85-22120**

**THE DIRECTIONAL SELECTIVITY OF NEURONS OF THE SUPERIOR COLLICULUS IN CATS - THE INFLUENCE OF STIMULUS VELOCITY [DIREKTSIONAL'NAIA IZBIRATEL'NOST' NEIRONOV PEREDNIKHOV BUGROV CHETVEROKHOLMIIA KOSHIK - VLIANIE SKOROSTI DVIZHENIIA STIMULA]**

G. I. NOVIKOV, N. B. KISELEVA, and N. F. PODVIGIN (Akademii Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 70, Oct. 1984, p. 1436-1441. In Russian. refs

**A85-22225\*** Massachusetts Inst. of Tech., Cambridge.  
**DOPAMINE STIMULATION OF PHOSPHATIDYLCHOLINE (LECITHIN) BIOSYNTHESIS IN RAT BRAIN NEURONS (PHOSPHOLIPID HOLAMINES/ NOREPINEPHRINE)**

C. E. LEPROHON, J. K. BLUSZTAJN, and R. J. WURTMAN (MIT, Cambridge, MA) National Academy of Sciences, Proceedings (ISSN 0027-8424), vol. 80, April 1983, p. 2063-2066. Research supported by the Center for Brain Science and Metabolism Charitable Trust. refs  
 (Contract NIH-MH-28783; NGR-22-009-627)

**A85-22496**

**PHYSIOLOGICAL MECHANISMS FOR THE REGULATION OF MICROCIRCULATION IN THE CEREBRAL CORTEX [FIZIOLOGICHESKIE MEKHAIZMY REGULIROVANIYA MIKROTSIRKULIATSII V KORE GOLOVNOGO MOZGA]**

G. I. MCHEDLISHVILI and D. G. BARAMIDZE (Akademii Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Nov. 1984, p. 1473-1483. In Russian. refs

The role of the pial arterial system (PAS) in regulating microcirculation in the cerebral cortex is examined. Experimental data show that this role consists in: (1) the regulation of adequate microcirculation in the whole cortex and in its individual sections (including the basin of a single radial artery); (2) the rapid redistribution of blood between the smallest regions of the cortex with the aid of pial arterial microanastomosis; and (3) the regulation of microcirculation intensity through differences in the intensity of reactions and latent periods of different segments of the PAS.

B.J.

**A85-22497**

**INTERRELATIONSHIP BETWEEN MICROLEVELS AND MACROLEVELS IN THE FUNCTIONAL ORGANIZATION OF THE ACTIVITY OF THE VASCULAR SYSTEMS OF THE BRAIN [O VZAIMOSVIAZI MIKRO-I MAKROUROVNEI V FUNKSIONAL'NOI ORGANIZATSII DEIATEL'NOSTI SOSUDISTOI SISTEMY GOLOVNOGO MOZGA]**

IU. E. MOSKALENKO (Akademii Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Nov. 1984, p. 1484-1497. In Russian. refs

Data are presented which evidently show that existing ideas on the functional organization of the regulation system for brain circulation (including the idea that there exist two types of brain blood-flow dynamics) are rough and approximate to a significant degree. It is noted that the processes which support brain activity are phenomenologically expressed in blood-flow changes in various parts of the brain and in changes in conditions of blood flow to and from the brain. These processes are shown to depend on a complex mechanism consisting of several regulatory elements; the actuating links of this mechanism exhibit a diverse localization: from the reactions of individual vessels and their microzones to generalized vascular reactions.

B.J.

**A85-22498**

**CORONARY INOTROPIC EFFECTS ON THE HEART [KORONARNYE INOTROPNYE VLIANIYA NA SERDTSE]**

L. I. OSADCHII and T. V. BALUEVA (Akademii Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Nov. 1984, p. 1498-1505. In Russian. refs

Data are presented which suggest that interrelations of arterial pressure and heart activity are based on a coronary inotropic mechanism. The dependence of coronary flow on arterial pressure assures (to a significant degree) the maintenance of the necessary level of heart activity as resistance to cardiac function increases. This can refer to cases of intensified arterial pressure due to primary systemic vasoconstriction as well as to a secondary increase in stroke volume, caused by an increase in venous flow to the heart. In both cases, inotropic effects from coronary vessels can contribute to an intensification of systoles and maintain this

level of increased heart activity without a further stretching of its cavities.

B.J.

**A85-22499**

**COMPARATIVE STUDIES OF CONTROL LAWS FOR SKIN BLOOD FLOW IN A THERMALLY NEUTRAL ZONE [SRAVNITEL'NYE ISSLEDOVANIYA ZAKONOV UPRAVLENIIA KOZHNYM KROVOTOKOM V TERMONEITRAL'NOI ZONE]**

IA. A. BEDROV, B. I. GEKHMANN, and E. A. VERSHININA (Akademii Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Nov. 1984, p. 1518-1526. In Russian. refs

A simplified model describing the behavior of the thermoregulation system of rabbits in the thermally neutral zone is considered. This model is used to study three types of control laws for skin blood flow: additive, multiplicative, and relay. Results of an experimental study show that observed fluctuations of body temperature can be explained only if a relay control law is assumed.

B.J.

**A85-22514**

**MUTAGENESIS AND RADIATION LEVELS IN POPULATION HABITATS [MUTAGENEZ I UROVNI RADIATSII V MESTAKH OBITANIYA POPULIATSII]**

N. P. DUBININ and V. A. KALCHENKO (Akademii Nauk SSSR, Institut Obshchei Genetiki, Moscow, USSR) Akademii Nauk SSSR, Izvestia, Seriya Biologicheskaya (ISSN 0002-3329), Sept.-Oct. 1984, p. 645-655. In Russian. refs

The effects of chronic radiation on three geographically isolated populations of the cross-pollinating perennial plant *Centaurea Scabiosa* L. have been investigated experimentally. The specific purpose of the study was to determine the mutational frequency of isozyme-coding alleles at the Lap locus. Samples from the plant populations were exposed to chronic radiation from <sup>90</sup>Sr-<sup>90</sup>Y radionuclides at dose rates of 0.001 to 0.07 gr/day, which corresponded to doses per generation of 0.4 to 8.5 gr. Analysis of the offspring of a population of plants with a known genotype showed that the frequency of chlorophyll and biochemical mutation at the Lap locus was directly related to the dose/rate of the radiation. The frequency of chlorophyll and point mutations per locus per generation was inversely related to the dose rate when calculated by dose unit. The observed increase in the amount of genetic variation as a result of chronic radiation at the Lap locus is found to be in agreement with results from field observations.

I.H.

**A85-22515**

**BLOOD PLASMA ALPHA-1-ANTITRYPSIN AND ALPHA-2-MACROGLOBULIN ACTIVITY IN COMBINED RADIATION-THERMAL TRAUMA [AKTIVNOST' ALPHA-1-ANTITRIPSINA I ALPHA-2-MAKROGLOBULINA V PLAZME KROVI PRI RADIATSIONNO-TERMICHESKOI TRAVME]**

L. A. KONNOVA and G. S. NOVOSELOVA (Ministerstvo Zdravookhraneniya SSSR, Tsentral'nyi Nauchno-Issledovatel'skii Rentgenoradiologicheskii Institut, Leningrad, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1984, p. 17-20. In Russian. refs

**A85-22516**

**CHANGES IN CENTRAL HEMODYNAMIC PARAMETERS DURING VENTRICULAR TACHYCARDIA [IZMENENIE POKAZATELEI TSENTRAL'NOI GEMODINAMIKI VO VREMIA ZHELUDOCHKOVOI TAKHIKARDII]**

S. IA. MAKHMUDOV, V. V. CHERNYSHOV, and S. F. NIKONOV (Akademii Meditsinskikh Nauk SSSR, Institut Serdechno-Sosudistoi Khirurgii, Moscow, USSR) Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (ISSN 0031-2991), Sept.-Oct. 1984, p. 24-27. In Russian. refs

A85-22517

**THE EFFECT OF ISCHEMIA ON THE LINKING OF STIMULATION AND CONTRACTION PROCESSES IN RAT PAPILLARY MUSCLE [VLIANIE ISHEMII NA SOPRIAZHENIE PROTSESSOV VOZBUZHDENIIA I SOKRASHCHENIIA V PAPIILLARNOI MYSTSE KRYS]**

M. R. MUKUMOV, I. U. S. LIAKHOVICH, S. A. ISAEVA, N. A. MALINA, and V. F. PORTNOI (Nauchno-Issledovatel'skii Institut po Biologicheskimi Ispytaniyam Khimicheskikh Soedinenii; Akademiia Meditsinskikh Nauk SSSR, Institut Khirurgii, Moscow, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1984, p. 27-31. In Russian. refs

A85-22518

**THE ROLE OF THE SYMPATHETIC NERVOUS SYSTEM IN CHANGES OF SYSTEMIC HEMODYNAMICS AND MYOCARDIAL CONTRACTILITY IN RATS WITH CONGENITAL HYPERTENSION [ROL' SIMPATICHESKOI NERVNOI SISTEMY V IZMENENIIAKH SISTEMNOI GEMODINAMIKI I SOKRATIMOSTI MIOKARDA U KRYA S NASLEDSTVENNO OBUSLOVLENNOI GIPERTENZIEI]**

KH. M. MARKOV, V. G. PINELIS, V. S. POLESHCHUK, L. I. NEBOLSINA, and A. V. KOZLOV (Akademiia Meditsinskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Pediatrii, Moscow, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1984, p. 35-40. In Russian. refs

A85-22519

**A MECHANISM FOR THE HYPOTENSIVE EFFECT OF INCREPAN [O MEKHANIZME GIPOTENZIVNOGO DEISTVIA INKREPANA]**

M. S. SUROVIKINA, S. V. ANDREEV, and I. D. KOBKOVA (Akademiia Meditsinskikh Nauk SSSR, Institut Morfologii Cheloveka; Moskovskii Oblastnoi Nauchno-Issledovatel'skii Klinicheskii Institut, Moscow, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1984, p. 40-43. In Russian. refs

The mechanism for the hypotensive effect of increpan is discussed. It is shown in a series of experiments with animals that increpan contains kinin-producing enzymes which help promote vasodilation. It is suggested that during treatment with increpan the effect of chymotrypsin on blood kinins is not detectable due to the rapid increase in accretion of proteolytic enzyme inhibitors, and that the long-term hypotensive effect of the drug is produced by RN-ase activity and free blood kinins. I.H.

A85-22520

**THE USE OF HOT AND COLD FOR THE REGULATION OF CIRCULATION AND THE MAINTENANCE OF HEMOSTASIS [ISPOL'ZOVANIE TEPLA I KHOLODA DLIA REGULIATSII KROVOTOKA I PODDERZHANIIA GEMOSTAZA VNUTRENNIKH ORGANOV]**

A. L. URAKOV, V. N. PUGACH, A. P. KRAVCHUK, M. I. SABSAI, and A. G. BARANOV (Izhevskii Meditsinskii Institut, Izhevsk, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Sept.-Oct. 1984, p. 43-46. In Russian. refs

It is shown through a series of experiments with dogs that hypothermia at 20 C had a significant spasmolytic effect on the development of blood clots (thrombogenesis) in the intestinal and uterine blood vessels. Hyperthermia was found to contribute to the development of spastic reactions and stimulate a prethrombotic state. Some possible mechanisms for the observed phenomena are discussed. I.H.

A85-22523

**THE PREVENTION OF DISORDERS IN THE CONTRACTILE FUNCTION OF THE HEART DURING AN EXPERIMENTAL INFARCTION WITH THE HELP OF PRELIMINARY ADAPTATION TO THE EFFECTS OF STRESS AND OPIOID PEPTIDES [PREDUPREZHDENIE NARUSHENII SOKRATITEL'NOI FUNKTSII SERDTSA PRI EKSPERIMENTAL'NOM INFARKTE S POMOSHCH'IU PREDVARITEL'NOI ADAPTATSII K STRESSOVYM VOZDEISTVIIAM I OPIOIDNYKH PEPTIDOV]**

F. Z. MEERSON, A. D. DMITRIEV, and V. I. ZAIATS (Akademiia Meditsinskikh Nauk SSSR, Institut Obshchei Patologii i Patologicheskoi Fiziologii, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 24, Sept. 1984, p. 81-88. In Russian. refs

It is shown that preliminary adaptation to immobilization stresses reduced impairments of contractile function in the left ventricle during an infarction under both rest conditions and after blocking of the aorta. Some of the mechanisms for the protective effects of stress adaptation are discussed. Adaptation to stress was also found to increase the level of enkephalins and Beta-endorphins in the cerebral and adrenal regions. It is demonstrated that preliminary administration of Beta-endorphins prior to the infarction prevented stress-related disorder of contractile function in the right atrium. I.H.

A85-22546

**DESCENDING EFFERENTS FROM THE SUPERIOR COLLICULUS RELAY INTEGRATED MULTISENSORY INFORMATION**

M. A. MEREDITH and B. E. STEIN (Virginia, Medical College, Richmond, VA) Science (ISSN 0036-8075), vol. 227, Feb. 8, 1985, p. 657-659. refs (Contract NIH-EY-04119)

By means of their efferent projections to motor and premotor structures, the cells in the deep superior colliculus are intimately involved in behaviors that control the orientation of the eyes, pinnae, and head. These same efferent cells receive multiple sensory inputs, thereby apparently enabling an animal to orient its receptor organs in response to a wide variety of cues. This sensory convergence also provides a system in which motor responses need not be immutably linked to individual stimuli but can vary in reaction to the multitude of stimuli present in the environment at any given moment. Author

**N85-16416# Joint Publications Research Service, Arlington, Va. USSR Report: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES Abstracts Only**

19 Jul. 1984 124 p Transl. into ENGLISH from various Russian articles (JPRS-UBB-84-015) Avail: NTIS HC A06

Topics relating to the following subject areas are discussed: aerospace medicine, agriculture, biochemistry, epidemiology, food processing, human factors, and immunology. In addition, laser applications, marine biology, microbiology, medicine, radiation effects, pharmacology, and toxicology are considered. Physiology, public health, psychology, radiobiology, and veterinary medicine are also addressed.

**N85-16421\*# National Aeronautics and Space Administration, Washington, D. C.**

**THE LIPID COMPOSITION AND ITS ALTERATION DURING THE GROWTH STAGE IN PATHOGENIC FUNGUS, EPIDERMOPHYTON FLOCCOSUM**

T. YAMADA, R. WATANABE, Y. NOZAWA, and Y. ITO Apr. 1984 19 p refs Transl. into ENGLISH from Shinkin to Shinkinsho (Japan), v. 19, no. 3, 1978 p 229-237 Transl. by Kanner (Leo) Associates, Redwood City, Calif. (Contract NASW-3541)

(NASA-TM-77440; NAS 1.15:77440) Avail: NTIS HC A02/MF A01 CSDL 06C

Qualitative and quantitative changes of lipid components during the growth stages were studied in *E. floccosum*. The acyl group components of total lipids of *Trichophyton rubrum* and *Microsporum cookei* were also examined. The lipids of *E. floccosum* amounted

to approximately 4% of the dry cell weight. Neutral lipids mainly consisted of triglycerides and sterols, and major polar lipids were phosphatidylcholine, phosphatidylethanolamine, and an unknown lipid X. The fatty acids in triglycerides and phospholipids were palmitic, palmitoleic, stearic, oleic, and linoleic acids. The unknown polar lipid X which appeared between phosphatidylethanolamine and cardiolipin on thin layer chromatography plates contained no phosphorus. There was no significant change in the fatty acid components of *E. floccosum* and *T. rubrum* during the cell growth, whereas profound changes occurred in *M. cookei*. The sterol components of *E. floccosum* showed striking changes depending on the growth stage. Author

**N85-16422\*** National Aeronautics and Space Administration, Washington, D. C.

**THE DEVELOPMENT OF THE VESTIBULAR APPARATUS UNDER CONDITIONS OF WEIGHTLESSNESS**

Y. A. VINNIKOV, O. G. GAZENKO, D. V. LYCHAKOV, and L. R. PALMBAKH Aug. 1984 27 p refs Transl. into ENGLISH from Zh. Obshchey Biol. (USSR), v. 44, no. 2, 1983 p 147-163 (Contract NASW-3541) (NASA-TM-77517; NAS 1.15:77517) Avail: NTIS HC A03/MF A01 CSCL 06C

A series of experiments has been carried out on the effect of space flight conditions on morphogenesis and the structure of the vestibular apparatus in amphibian and fish larvae. Larval development proceeded in weightlessness without serious morphological defects. The vestibular apparatus developed; its organization in the experimental animals did not differ qualitatively from that in the controls. The specific external stimulus (gravitation) appears not to be a necessary condition for the development of a gravitation receptor in ontogenesis although the appearance of the vestibular apparatus in phylogenesis was apparently related to this stimulus. Author

**N85-16423#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**AN ATROPINIZED HEAT-STRESSED RAT MODEL: DOSE RESPONSE EFFECTS AND PHARMACOKINETICS**

C. B. MATTHEW, R. W. HUBBARD, and R. P. FRANCESCONI Oct. 1984 24 p (Contract DA PROJ. 3M1-62734-A-875) (AD-A146851; USARIEM-M3/85) Avail: NTIS HC A02/MF A01 CSCL 06C

Atropine and other anticholinergic drugs are widely used in common medications such as antihistamines and tranquilizers as well as in the treatment of organophosphate poisoning. Since atropine administration inhibits thermoregulatory efficiency in the heat in both man and the rat by reducing sweating and salivation respectively, we sought to quantitate the effects of atropine in our rat heatstroke model. Using this sedentary, heat-stressed rat model, we have determined that atropine increases the heating rate up to 3h after drug administration and that this elevation in heating rate is dose-dependent over the range from 10-1000ug/kg. The clinically used human dosages of atropine fall well within this range. GRA

**N85-16424#** Army Cold Regions Research and Engineering Lab., Hanover, N. H.

**EFFECTS OF LOW TEMPERATURES ON THE GROWTH AND UNFROZEN WATER CONTENT OF AN AQUATIC PLANT**

A. J. PALAZZO, A. R. TICE, J. L. OLIPHANT, and J. M. GRAHAM Jun. 1984 15 p (AD-A147107; CRREL-84-14) Avail: NTIS HC A02/MF A01 CSCL 06C

Two laboratory studies were performed to investigate the effects of low temperatures on the aquatic weed plant *Ceratophyllum demersum* L. Whole plants were subjected to low-temperature treatments of +4 deg, 0 deg and -6 deg C for 48 hours, and regrowth was compared to an untreated control. The control and +4 deg C-treated plants gained weight, while visible injury and reductions in plant biomass were noted 30 days after treatment at the two lower temperatures. The -6 deg C treatment killed the

plants, while the 0 deg C treatment injured them to some degree. In another phase of this study, nuclear magnetic resonance (NMR) analysis of plant buds, leaves and stems showed that lowering temperatures caused the plants' unfrozen water content to drop rapidly as the temperature approached -5 deg C, then slowly as temperatures approached -13 deg C. From -13 deg C to -22 deg C there was little change in unfrozen water content. The results show that ice in this plant causes injury that affects subsequent regrowth; temperatures of -6 deg C or below can actually kill them. This killing temperature was also near the point where frozen water content increased only slightly with lower temperatures. NMR analysis could be one way of determining plant tolerance to cold. It appears from this study that this weedy species is susceptible to low-temperature injury, and subjecting this plant to cold may be a promising method of weed control in northern lakes. GRA

**N85-16425#** California Univ., Irvine, Dayton, Ohio. Toxic Hazards Research Unit.

**TOXIC HAZARDS RESEARCH Annual Technical Report, Jun. 1983 - Jun. 1984**

J. D. MACEWEN and E. H. VERNOT Wright-Patterson AFB, Ohio AMRL Sep. 1984 212 p (Contract F33615-80-C-0512) (AD-A147857; AFAMRL-TR-84-001; NMRI-TR-84-42; ATR-21) Avail: NTIS HC A10/MF A01 CSCL 06T

The research program of the Toxic Hazards Research Unit (THRU) for the period of June 1983 through May 1984 is reviewed. Chronic toxicity and oncogenic studies were carried out with hydrazine, JP-4 and JP-8. A series of acute toxicity studies was conducted on a variety of chemicals and chemical agents used by the Army, Air Force, and Navy. Neurotoxicity and subchronic inhalation studies were conducted on several hydraulic fluids and lubricants. GRA

**N85-16426#** Joint Publications Research Service, Arlington, Va. **USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES**

27 Dec. 1984 159 p Transl. into ENGLISH from various Russian articles (JPRS-UBB-84-027) Avail: NTIS HC A08

The following topics are considered: aerospace medicine, agriculture, biochemistry, bionics, biophysics, epidemiology, and genetics. In addition, immunology, laser applications, microbiology, and radiation effects are addressed. Research in pharmacology, toxicology, physiology, public health, and radiobiology is also reported.

**N85-16427#** Joint Publications Research Service, Arlington, Va. **DISTINCTIONS OF SPF RATS USED IN EXPERIMENTS ABOARD BIOSATELLITES**

N. N. LIZKO, V. I. KOROLKOV, L. N. PETROVA, V. M. SHILOV, V. N. FROLOV, and L. V. SEROVA In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPS-UBB-84-027) p 1-4 27 Dec. 1984 Transl. into ENGLISH from Vestn. Selskokhozyaystvennoy Nauki (Moscow), no. 8, Aug. 1984 p 123-126 Avail: NTIS HC A08

Before performing experiments aboard biosatellites, the intestinal microbiocenosis of 100 SPF rats was studied in order to pursue dynamic observation of changes in intestinal microflora from the time the animals arrived in the vivarium to the start of the flight. Results indicate marked microbial contamination in the first ten days in the vivarium. It was the most active with regard to gram-negative bacteria. Changes in intestinal microflora of SPF animals were investigated in three experiments aboard Cosmos satellites. The main distinction of intestinal microflora in SPF animals was the stability of lactoflora, which was demonstrated in most rats. Lactoflora resistance to extreme conditions aided the SPF rats in responding favorably to space flight stress. R.S.F.

**N85-16430#** Joint Publications Research Service, Arlington, Va.  
**VARIATION IN PHOTOSYNTHESIS WITH LIGHT LEVEL FOR MODEL WITH TWO PHOTOCHEMICAL REACTIONS Abstract Only**

V. I. ZVALINSKIY and F. F. LITVIN *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 38 27 Dec. 1984 Transl. into ENGLISH from Biofiz. (Moscow), v. 29, no. 4, Jul. - Aug. 1984 p 542-547  
 Avail: NTIS HC 08

A model was developed previously describe the variation in the rate of photosynthesis for one of two photochemical reactions as a function of light intensity. The influence of the different organization of photosynthetic units and the limiting dark reaction accompanied by a reaction center cycle was considered in this model. This approach is extended herein to allow analysis of the light dependence of photosynthesis considering both photochemical reactions. The shape of the light curve is independent of the location of the link which limits the speed of the dark reaction with respect to the two light reactions. It is determined only by the relative resistance of this link with respect to the total resistance of dark reactions in the reaction center cycles. The form of the light curves should depend on the degree of interaction of the two photosystems, that is, the degree of balance of excitation of the two photosystems. The form of the light curve should also depend on the spectral composition of the light. Author

**N85-16434#** Joint Publications Research Service, Arlington, Va.  
**DISTRIBUTION OF BLOOD FLOW TO BRAIN, KIDNEYS, GUT, SPLEEN AND POSTERIOR EXTREMITIES IN CATS IN ACUTE HYPOXIA Abstract Only**

B. B. IRIPKhanov, A. I. KRIVCHENKO, and Y. Y. MOSKALENKO *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 106 27 Dec. 1984 Transl. into ENGLISH from Fiz. Zh. Imeni I. M. Sechenova (Leningrad), v. 70, no. 5, May 1984 p 728-731 Original language document was announced in IAA as A84-40698  
 Avail: NTIS HC A08

Experiments performed on cats indicate that a particular type of adaptive reaction occurs in the cardiovascular system during acute hypoxia. This type of reaction is directed toward compensation of oxygen deficiency, primarily in the most vital organs. This occurs as a consequence of differences in the sensitivities of vessels of different organs to arterial PO<sub>2</sub>, which makes possible the redistribution of blood during acute hypoxia. B.J.(IAA)

**N85-17230\*#** National Aeronautics and Space Administration.  
 Goddard Space Flight Center, Greenbelt, Md.  
**THE USE OF DIGITAL SPACEBORNE SAR DATA FOR THE DELINEATION OF SURFACE FEATURES INDICATIVE OF MALARIA VECTOR BREEDING HABITATS**

M. L. IMHOFF, C. H. VERMILLION, and F. A. KHAN (Space Research and Remote Sensing Organization, Dacca, Bangladesh) *In* JPL The SIR-B Sci. Invest. Plan 3 p 1 Jul. 1984 refs  
 Avail: NTIS HC A10/MF A01 CSCL 06C

An investigation to examine the utility of spaceborne radar image data to malaria vector control programs is described. Specific tasks involve an analysis of radar illumination geometry vs information content, the synergy of radar and multispectral data mergers, and automated information extraction techniques. M.G.

**N85-17508\*#** Marquette Univ., Milwaukee, Wis. Dept. of Biology.

**EFFECT OF DISUSE ON SARCOPLASMIC RETICULUM IN FAST AND SLOW SKELETAL MUSCLE**

D. H. KIM, F. A. WITZMANN, and R. H. FITTS 1982 5 p refs Repr. from the Am. J. of Physiol., no. 243, 1982 p C156-C160 (Contract NAS9-15711; NIH-AM-22037; NIH-AM-00810) (NASA-CR-174337; NAS 1.26:174337) Avail: NTIS HC A02/MF A01 CSCL 06B

The effect of 6 weeks of hindlimb immobilization on rat skeletal muscle sarcoplasmic reticulum (SR) was determined in the

slow-twitch, type 1 soleus (SOL); the fast-twitch, type 2A deep region of the vastus lateralis (DVL), and the fast-twitch, type 2B superficial region of the vastus lateralis (SVL). Immobilization produced a significant decline in the Ca(2+) uptake rate (V sub max) of SR vesicles from the slow SOL, while the SR V sub max increased in the fast SVL and was unaltered in the DVL. Vesicles from the fast SVL and DVL also exhibited a higher total Ca(2+) uptake capacity following immobilization. An evaluation of the time course of the immobilization-mediated effect revealed an increased Ca(2+) uptake capacity in all three samples after 1 wk. In the SOL total Ca(2+) uptake returned to control level after 2 wk, while in the fast-twitch muscles the higher capacities were maintained. The Ca(2+)-stimulated SR ATPase activity was not altered in any of the muscle studies. R.S.F.

**N85-17509\*#** Marquette Univ., Milwaukee, Wis. Dept. of Biology.

**ACID PHOSPHATASE AND PROTEASE ACTIVITIES IN IMMOBILIZED RAT SKELETAL MUSCLES**

F. A. WITZMANN, J. P. TROUP, and R. H. FITTS 13 Apr. 1982 6 p refs Repr. from the Can. J. of Physiol. and Pharmacol. (Canada), v. 60, no. 12, 1982 p 1732-1736 (Contract NAS9-15711; NIH-AM-22037; NIH-AM-00810) (NASA-CR-174340; NAS 1.26:174340) Avail: NTIS HC A02/MF A01 CSCL 06B

The effect of hind-limb immobilization on selected lysosomal enzyme activities was studied in rat hind-limb muscles composed primarily of type 1, 2A, or 2B fibers. Following immobilization, acid protease and acid phosphatase both exhibited significant increases in their activity per unit weight in all three fiber types. Acid phosphatase activity increased at day 14 of immobilization in the three muscles and returned to control levels by day 21. Acid protease activity also changed biphasically, displaying a higher and earlier rise than acid phosphatase. The pattern of change in acid protease, but not acid phosphatase, closely parallels observed muscle wasting. The present data therefore demonstrate enhanced proteolytic capacity of all three fiber types early during muscular atrophy. In addition, the data suggest a dependence of basal hydrolytic and proteolytic activities and their adaptive response to immobilization on muscle fiber composition. Author

**N85-17510\*#** Marquette Univ., Milwaukee, Wis. Dept. of Biology.

**A COMPARISON OF RAT MYOSIN FROM FAST AND SLOW SKELETAL MUSCLE AND THE EFFECT OF DISUSE**

B. R. UNSWORTH, F. A. WITZMANN, and R. H. FITTS 14 Jul. 1981 8 p refs Repr. from the J. of Biol. Chem. (US), v. 257, no. 24, 25 Dec. 1982 p 15129-15136 (Contract NAS9-15711; NIH-AM-22037; NIH-AM-00810) (NASA-CR-174339; NAS 1.26:174339) Avail: NTIS HC A02/MF A01 CSCL 06C

Certain enzymatic and structural features of myosin, purified from rat skeletal muscles representative of the fast twitch glycolytic (type IIb), the fast twitch oxidative (type IIa), and the slow twitch oxidative (type I) fiber, were determined and the results were compared with the measured contractile properties. Good correlation was found between the shortening velocities and Ca(2+)-activated ATPase activity for each fiber type. Short term hind limb immobilization caused prolongation of contraction time and one-half relaxation time in the fast twitch muscles and a reduction of these contractile properties in slow twitch soleus. Furthermore, the increased maximum shortening velocity in the immobilized soleus could be correlated with increased Ca(2+)-ATPase, but no change was observed in the enzymatic activity of the fast twitch muscles. No alteration in light chain distribution with disuse was observed in any of the fiber types. The myosin from slow twitch soleus could be distinguished from fast twitch myosins on the basis of the pattern of peptides generated by proteolysis of the heavy chains. Six weeks of hind limb immobilization resulted in both an increased ATPase activity and an altered heavy chain primary structure in the slow twitch soleus muscle. R.S.F.

**N85-17511#** Civil Aeromedical Inst., Oklahoma City, Okla.  
**TOLERANCE ENDPOINT FOR EVALUATING THE EFFECTS OF HEAT STRESS IN DOGS**

G. D. HANNEMAN and J. L. SERSHON Jun. 1984 25 p  
 (AD-A148104; FAA-AM-84-5) Avail: NTIS HC A02/MF A01  
 CSCL 06S

Animals occasionally die from heat stress encountered during shipment in the nation's transportation systems. To provide a basis for a series of studies on shipping crates, environmental conditions, etc., as may be encountered in air transport of dogs, we sought to establish a suitable tolerance endpoint for heat/humidity stress in dogs. We monitored the heart rate, respiratory/panting rate, and rectal temperature of 10 male beagle dogs exposed to an air temperature of  $95 \pm 1$  F (relative humidity  $93 \pm 2$  percent) for less than 24 hours. Of the first six animals, two died during exposure, two died after being removed from the test chamber, and two survived a 24-hour exposure. Based on observations from these six dogs, a rectal temperature of 108 F was tentatively chosen as the tolerance endpoint for subsequent tests. Of four additional animals tested, two were removed from the environmental chamber when their rectal temperature reached 108 F and the two others finished the test with a rectal temperature not exceeding 102.7 F. No ill effects were noted in any of the surviving six animals during a 7-day post-observation period. These and subsequent findings indicate a rectal temperature of 108 F can be safely tolerated and can serve as a tolerance limit for additional studies of heat and humidity effects on dogs. GRA

**N85-17512#** Aspen Center for Physics, Colo.

**WORKSHOP ON MEMBRANE BIOPHYSICS**

15 Jul. 1984 28 p Conf. held in Aspen, Colo., 25 Jun. - 15 Jul. 1984

(Contract N00014-84-G-0098)

(AD-A148238) Avail: NTIS HC A03/MF A01 CSCL 06P

Workshop on membrane biophysics was to collect together a group of biologists and biophysicists with common interests in membrane biology. Our aim was to get a fairly diverse group to promote cross-fertilization of ideas among different specialties in membrane biophysics. In the event, there were fourteen lectures spread over a period of three weeks from invitees, with an additional lecture on cell-cell contacts by Dr. George Bell (Los Alamos). The abstracts for the invited lectures are included to form the report of the workshop. The subject matter may be classified as follows: Excitable membranes and voltage controlled gates; Photosynthetic reaction centers; Acetylcholine receptor; Visual transduction; Motility mechanism in bacteria; Protein-protein interactions. GRA

**N85-17513#** Letterman Army Inst. of Research, San Francisco, Calif. Toxicology Group.

**ACUTE ORAL TOXICITY (LD50) OF 4-NITROPHENYL MONOCHLOROMETHYL (PHENYL) PHOSPHINATE (TA009) IN MALE RATS Final Report, 22 Sep. - 19 Oct. 1982**

C. W. WHITE, J. RODRIGUEZ, and T. P. KELLNER Oct. 1984 27 p

(Contract DA PROJ. 351-62771-A-875)

(AD-A148337; LAIR-191; TOXICOLOGY/SER-55) Avail: NTIS HC A03/MF A01 CSCL 06T

The acute oral toxicity of 4-nitrophenyl monochloromethyl (phenyl) phosphinate was determined in male, albino, Sprague-Dawley rats by using the oral gavage dose method. LD1, LD50, and LD95 with the 95% confidence limit were calculated by probit analysis. The LD50 was 203 mg/kg with the 95% confidence limit (142 mg/kg, 292 mg/kg). The formulation falls in the very toxic range. GRA

**N85-17514#** Professional Staff Association of Los Angeles County/Univ. of Southern California Medical Center, Los Angeles.

**BIBLIOGRAPHY OF VENOMOUS AND POISONOUS MARINE ANIMALS AND THEIR TOXINS Final Report, 1969 - 1982**

F. E. RUSSELL, H. GONZALEZ, S. B. DOBSON, and J. A. COATS Feb. 1984 425 p Prepared in cooperation with Arizona Univ., Tucson

(Contract N00014-80-C-0868)

(AD-A148409) Avail: NTIS HC A18/MF A01 CSCL 06C

This bibliography includes a list of the titles and citations of most of the papers on the subject of venomous and poisonous marine organisms and their toxins published before 1981. It contains 6,779 citations listed by major phyletic group (principally by phylum). Also included is an author index. GRA

**N85-17515#** Joint Publications Research Service, Arlington, Va.  
**USSR REPORT: LIFE SCIENCES. BIOMEDICAL AND BEHAVIORAL SCIENCES Abstracts Only**

7 Jan. 1985 43 p refs Transl. into ENGLISH of various Russian articles

(JPRS-UBB-85-001) Avail: NTIS HC A03/MF A01

Various topics relating to the life sciences are discussed, including biochemistry, biophysics, food technology, laser effects, marine mammals, and medicine. In addition, microbiology, nonionizing electromagnetic radiation, pharmacology, physiology, public health, radiation biology, and virology are considered.

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## AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

**A85-19932**

**CURRENT TRENDS IN THE DEVELOPMENT OF HUMAN ECOLOGICAL PHYSIOLOGY [SOVREMENNYE TENDENTSI V RAZVITII EKOLOGICHESKOI FIZIOLOGII CHELOVEKA]**

N. N. VASILEVSKII (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Meditsiny, Leningrad, USSR) Fiziologiya Cheloveka (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 883-893. In Russian. refs

The literature on human ecological physiology is surveyed, with particular emphasis placed on questions of adaptation to extreme environments. Special attention is given to the relation between adaptation and stress and homeostasis dynamics, the relation between states of overstress and pathology, and the relation between disadaptation disorders and prepathological states. Space ecology is considered in relation to the manned Soyuz, Salyut, and Apollo-Soyuz flights. The work of Biurukov in the area of human ecological physiology is discussed. B.J.

**A85-19933**

**PROBLEMS IN THE SIMULATION AND OPTIMIZATION OF THE FUNCTIONAL CONDITION AND ACTIVITY OF A HUMAN OPERATOR [PROBLEMY MODELIROVANIYA I OPTIMIZATSII FUNKTSIONAL'NOGO SOSTOYANIYA I DEIATEL'NOSTI CHELOVEKA-OPERATORA]**

A. M. ZINGERMAN and L. S. KHACHATURIANTS (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Meditsiny, Leningrad, USSR) Fiziologiya Cheloveka (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 894-906. In Russian. refs

Human adaptation to various factors of space flight (e.g., hypodynamia and weightlessness) is studied with particular reference to the simulation of continuous operator activity (COA). An example of COA was the Apollo repair mission to Skylab, during which the crew worked continuously for 30 hours. It is shown that the COA mode makes great demands on the psychophysiological capacities of the operators and the mobilization



of their reserves, thus making possible continuous work for 30-32 hours. A reduction in reserve-mobilization capacity then ensues, leading to a drastic deterioration in work quality. B.J.

## A85-19934

**HUMAN ADAPTATION TO THE EXTREME CONDITIONS OF ANTARCTICA [ADAPTATSIYA CHELOVEKA K EKSTREMAL'NYM USLOVIAM ANTARKTIDY]**

S. I. SOROKO, A. L. MATUSOV, and I. A. SIDOROV (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Meditsiny, Leningrad, USSR) *Fiziologiya Cheloveka* (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 907-920. In Russian. refs

An effort is made to clarify the problem of human adaptation to Antarctic conditions on the basis of multiyear complex ecological-physiological studies. These studies include the investigation of: (1) the ecological factors (natural and anthropogenic) of Antarctica; (2) individual features of the adaptive plasticity of central and vegetative mechanisms of regulation under various factors of the winter stay; (3) the dynamics of analyzer systems; (4) the work capacity of polar workers; (5) the psychoneural status of workers; and (6) the health of expedition members. It is concluded that the complex of extreme factors of Antarctica makes severe demands on the nervous, vegetative, and psychoemotional elements of human beings, calling forth all the reserve capacities of the body. B.J.

## A85-19935

**SPATIAL DYNAMICS OF BIOELECTRIC PROCESSES OF THE BRAIN IN THE CASE OF LONG-TERM CONTACT WITH PHYSICAL FACTORS [PROSTRANSTVENNAIA DINAMIKA BIOELEKTRICHESKIKH PROTSESSOV MOZGA PRI DLITEL'NOM KONTAKTE S FIZICHESKIMI FAKTORAMI]**

N. B. SUVOROV and G. V. KUKHTINA (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Meditsiny, Leningrad, USSR) *Fiziologiya Cheloveka* (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 921-928. In Russian. refs

An experimental study was conducted to investigate changes in brain bioelectric processes occurring in females who have worked for a long period of time (2-20 years) in an environment where they have been exposed to electromagnetic radiation of the centimeter and decimeter ranges. It is shown that, after prolonged exposure, this radiation produces phase changes in the spatially discrete organization of brain neuro rhythms. After a short period of exposure, a reduction in the functional-status level of the brain is accompanied by an intensified synchronization of potentials in the cortex zones studies; after prolonged exposure, a disturbance in the stability of intercentral relations and a functional unlinking of brain structures are noted. It is concluded that the maximum permissible period of work in an industrial environment where workers are exposed to microwave radiation is 7-14 years. B.J.

## A85-19936

**INDIVIDUAL-TYOLOGICAL DIFFERENCES IN THE SELF-REGULATION OF THE CARDIOVASCULAR SYSTEM [INDIVIDUAL'NO-TIPOLOGICHESKIE OSOBNOSTI SAMOREGULIATSII SERDECHNO-SOSUDISTOI SISTEMY]**

E. G. VASHCHILLO, M. A. KONSTANTINOV, and D. N. MENITSKII (Akademiia Meditsinskikh Nauk SSSR, Institut Eksperimental'noi Meditsiny, Leningrad, USSR) *Fiziologiya Cheloveka* (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 929-936. In Russian. refs

New data are reported pertaining to individual-typological differences in the guided self-regulation of heart rate (HR) and arterial pressure (AP) in a visual feedback tracking study. Particular attention is given to individual differences in the latency of effects from baroreceptors at different levels of CNS regulation, these differences being manifested in differences in the amplitude-phase characteristics of guided oscillations of HR and AP rhythms with respect to a sinusoidal control signal. It is concluded that the proposed technique can be used as a training tool in alternating-load exercise and to study the possibility of destabilizing a regulation system with the aim of changing its state. B.J.

## A85-19937

**CORRELATION BETWEEN THE CHARACTERISTICS OF PRESTIMULUS EEG AND THE EXTREME TIME OF SENSORIMOTOR REACTION [SOOTNOSHENIE MEZHDU KHARAKTERISTIKAMI PREDSTIMUL'NOI EEG I EKSTREMAL'NYM VREMENEM SENSOMOTORNOI REAKTSII]**

T. A. KOROLKOVA, V. D. TRUSH, A. V. KORINEVSKII, I. A. VASILEV, and E. E. OSTROVSKAIA (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR) *Fiziologiya Cheloveka* (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 951-958. In Russian. refs

In order to elucidate the functional significance of the spectral-correlation parameters of prestimulus EEG for human reaction time (RT), these parameters were investigated prior to reactions with extreme (shortest) latent period (LP). Simple reaction and RT with respect to auditory and visual stimuli were studied in healthy subjects 18-59 years of age. Changes of potential power spectra (PPS) of the neocortex during 4-5 sec epochs of the analysis prior to reactions with extreme values of LP were revealed which were similar in all areas of the neocortex. These changes consisted in different values of PPS in the alpha-rhythm band and to reciprocal relations of values in the band of slow and fast oscillations prior to reactions with short and long LPs. B.J.

## A85-19938

**ELECTROSTIMULATION FREQUENCY AND THE APPEARANCE OF TETANUS IN VARIOUS MUSCLES [O CHASTOTE ELEKTROSTIMULIATSII I VOZNIKNOVENII TETANUSA V RAZLICHNYKH MYSHTSAKH]**

N. V. ZIMKIN, V. G. PANOVA, and O. G. PAVLOV (Leningradskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) *Fiziologiya Cheloveka* (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 972-980. In Russian. refs

Studies were performed on people 19-24 years of age to determine the minimum frequency of electrostimulation by current of double threshold force at which tetanus is initiated in relaxed muscles (the torso and the upper and lower extremities); also studied were such manifestations of smooth tetanus as the optimum and pessimum of contraction. It is noted that the consideration of the magnitude of these indicators can facilitate a more optimal selection of electrostimulation frequencies. B.J.

## A85-19939

**EFFECT OF TRANQUILIZERS ON CRITICAL FLICKER FUSION FREQUENCY IN THE VISUAL ANALYZER [VLIANIE TRANKVILIZATOROV NA KRITICHESKUIU CHASTOTU SLIANIYA SVETOVYKH MEL'KANII V ZRITEL'NOM ANALIZATORE]**

B. I. BENKOVICH and O. V. MARSHAK (Akademiia Meditsinskikh Nauk SSSR, Institut Farmakologii, Moscow, USSR) *Fiziologiya Cheloveka* (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 999-1004. In Russian. refs

A method for determining the threshold of critical flicker fusion frequency (CFF) is proposed which is observed to be a highly sensitive and prognostically valuable tool for the assessment of the functional state of the visual analyzer in patients with borderline forms of nervous-psychic disorders in the course of tranquilizer therapy. The markedness of changes in CFF values due to a single administration of phenazepam is shown to depend on the initial level of the functional mobility of the visual analyzer. The CFF indicators in female patients were found to vary more under phenazepam than in male patients. B.J.



A85-19941

**NATURAL ELECTRICAL SYMPATHETIC ACTIVITY, REMOVED FROM THE SURFACE OF HUMAN SKIN [ESTESTVENNAIA ELEKTRICHESKAIA SIMPATICHESKAIA AKTIVNOST', OTVODIMAIYA OT POVERKHNOSTI KOZHI CHELOVEKA]**

V. I. SKOK, I. N. REMIZOV, L. V. MELNICHENKO, S. L. PURNYN, I. U. S. LISAICHUK, N. S. ZANOZDRA, and V. V. GERZANICH (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal SSSR (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 1027-1035. In Russian. refs

A method has been developed for the removal of the natural tonic sympathetic impulse activity of nerve fibers from the surface of human skin. The method consists in the accumulation and averaging of removed electric potentials using the EKG R-branch as the synchronizing impulse. A slow quasi-sinusoidal oscillation of electric potential (with a mean amplitude of  $0.08 \pm 0.03$  micro-V) is recorded that is synchronous with heart rhythm. The sympathetic nature of this oscillation is demonstrated experimentally. B.J.

A85-19942

**INVESTIGATION OF THE FUNCTIONS OF EXTERNAL BREATHING AND BLOOD CIRCULATION, DETERMINING AND LIMITING HUMAN PHYSICAL WORK CAPACITY [ISSLEDOVANIE FUNKTSII VNESHNEGO DYKHANIIA I KROVOOBRAZHENIIA, OPREDELIAIUSHCHIKH I LIMITIRUIUSHCHIKH FIZICHESKUIU RABOTOSPOSOBNOST' CHELOVEKA]**

N. P. KRASNIKOV (Krymskii Meditsinskii Institut, Simferopol, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 1036-1041. In Russian. refs

A85-19943

**DYNAMICS OF OXYGEN CONSUMPTION IN THE RECOVERY PERIOD AFTER SHORT-DURATION EXERCISES OF MAXIMUM FORCE [DINAMIKA POTREBLENIIA KISLORODA V VOSSTANOVITEL'NOM PERIODE POSLE KRATKOVREMENNYKH UPRAZHNENII PREDEL'NOI MOSHCNOSTI]**

N. V. IARUZHNYI (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0131-1646), vol. 10, Nov.-Dec. 1984, p. 1042-1044. In Russian. refs

A technique involving the discontinuous sampling of inspired air was used to study the characteristic features of oxygen-consumption kinetics in highly qualified athletes in the recovery period after strenuous short-duration exercise. During the performance of exercise with a duration up to 20 sec, a continuous increase in the level of oxygen consumption was observed immediately after the end of exercise; the highest level was achieved 15-30 sec after the beginning of the recovery period. B.J.

A85-20001

**THE COMPLEX APPROACH IN ECOLOGICAL-PHYSIOLOGICAL STUDIES (ON THE 80TH BIRTHDAY OF D. A. BIRIUKOV) [KOMPLEKSNIY PODKHOD V EKOLOGO-FIZIOLOGICHESKIKH ISSLEDOVANIYAKH /K 80-LETIU SO DNIA ROZHDENIYA D. A. BIRIUKOVA/]**

N. N. VASILEVSKII (Akademiia Meditsinskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Eksperimental'noi Meditsiny, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Sept. 1984, p. 1241-1247. In Russian. refs

Certain aspects of the collected work of Biriukov in the field of ecological physiology are reviewed. Attention is given to a description of investigations of the physiological characteristics of biological adaptation and the individual typological characteristics of human adaptive capacities. The principle methodology used in the investigations was: the analysis of the biorhythmological structure of neural and autonomic processes. The concept of the ecological adequacy of signals (ambient factors) in the natural environment is discussed, and some areas of research most likely to receive attention in the future are identified. I.H.

A85-20002

**CORRELATION BETWEEN CORTICAL AND AUTONOMIC PROCESSES IN THE REGULATION OF THE FUNCTIONAL STATES OF THE HUMAN BRAIN [VZAIMOSVIAZ' KORKOVYKH I VEGETATIVNYKH PROTSESSOV V REGULIATSII FUNKTSIONAL'NYKH SOSTOIANII MOZGA CHELOVEKA]**

V. I. KLIMOVA-CHEKASOVA, V. A. KUZEMKIN, I. M. MIKHAILOVA, and N. A. SIZAIA (Nauchno-Issledovatel'skii Institut Ekspertizy Trudospособnosti i Organizatsii Truda Invalidov, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Sept. 1984, p. 1265-1271. In Russian. refs

A85-20014

**THE BASIC CHARACTERISTICS OF FUNCTIONAL CHANGES IN THE HUMAN RESPIRATORY SYSTEM IN ADAPTATION TO HYPERBARIC CONDITIONS [OSNOVNYE ZAKONOMERNOSTI FUNKTSIONAL'NYKH IZMENENII SISTEMY DYKHANIYA CHELOVEKA PRI ADAPTATSII K GIPERBARII]**

S. A. GULIAR (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 667-679. In Russian. refs

The results of hyperbaric chamber studies of the mass transport conditions of respiratory gases in man are reported. It is shown that within a pressure range of 0.25-1.1 MPa in a moderately hyperoxic nitrogen helio-oxygen environment, oxygen and carbon dioxide levels are increased to permit adaptation to hyperbaria. The main respiratory mechanisms regulating mass transfer of O<sub>2</sub> and CO<sub>2</sub> under hyperbaric conditions appear to be an increase of dead breathing space and a decrease in the rate of O<sub>2</sub> diffusion through the alveole-capillary barrier. The main hemodynamic mechanism is the retention of blood circulation volume and cardiac output. The data obtained from the hyperbaric chamber investigations are considered to be in good agreement with observations of accelerated rehabilitation in divers through a program of adaptation to high altitudes. I.H.

A85-20016

**A RATIO BETWEEN SYSTEMIC AND CEREBRAL HEMODYNAMICS IN NORMAL YOUNG PEOPLE [SOOTNOSHENIE MEZHDU SISTEMNOI I MOZGOVOI GEMODINAMIKOI U ZDOROVYKH LITS MOLODOGO VOZRASTA]**

S. M. VINICHUK and A. ZELIGER (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 684-687. In Russian. refs

The proportion of systemic vs cerebral blood circulation was studied clinically in 62 people of ages 36-45. A direct correlation was found between the X-ray encephalogram amplitude and the shock index and inverse proportional dependence of minute blood volume of the brain with respect to the cardiac index. Central blood circulation was characterized by eukinetic, hyperkinetic, and hypokinetic blood types which corresponded to normovolemic, hypervolemic, and hypovolemic cerebral hemodynamic types, respectively. I.H.

A85-20017

**THE ACID-BASE STATE OF THE BLOOD ASSOCIATED WITH ADAPTATION TO ALPINE CONDITIONS IN MONO- AND DIZYGOTIC TWINS [KISLOTNO-OSNOVNOE SOSTOIANIE KROVI PRI ADAPTATSII K GORNOMY USLOVIAM U MONO- I DIZIGOTNYKH BLIZNETSOV]**

V. A. BEREZOVSKII, T. A. MELNIK, and T. V. SEREBROVSKAIA (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 687-692. In Russian. refs

## A85-20018

**THE GENOTYPE-SPECIFICITY OF BODY RESPONSE TO VEGETROPIC MEDIA UNDER CONDITIONS OF NORMOXIA AND HIGH-ALTITUDE HYPOXIA [O GENOTIPICHESKOI OBUSLOVLENNOSTI REAKTSII ORGANIZMA NA VEGETOTROPNYE SREDSTVA V USLOVIAKH NORMOKSII I VYSOKOGORNOI GIPOKSII]**

N. E. ZAITSEVA and M. L. TARAKHOVSKII (Kievskii Institut Pediatrii, Akusherstva i Ginekologii, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 692-696. In Russian. refs

The degree of genetic conditionality of the human body response to vegetropic drugs (tycholine, adrenaline and histamine) was studied experimentally in twins under normoxic conditions, and under hypoxic conditions at an altitude of 2060 meters. The experimental subjects were five pairs of monozygotic twins and six pairs of dizygotic twins aged 14 to 22 years. Essential differences were found in the character and intensity of responses to the drugs under the high-altitude hypoxic conditions. It is demonstrated that body response is, to a considerable extent, determined by the genotype of the individual. A table is presented which describes the experimental data in detail. I.H.

## A85-20019

**AGE CHANGES IN THE REGULATORY FUNCTION OF THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM [VOZRASTNYE IZMENENIYA REGULATORTNOI FUNKTSII RENIN-ANGIOTENZIN-AL'DOSTERONOVOL SISTEMY]**

A. S. ALI (Institut Usovershenstvovaniia Vrachei, Kiev, Ukrainian SSR) Fiziologicheskii Zhurnal (Kiev) (ISSN 0201-8489), vol. 30, Nov.-Dec. 1984, p. 708-714. In Russian. refs

The regulatory function of the renin-angiotensin-aldosterone system was investigated in 17 normal elderly subjects and in 20 young subjects in a rest state and under orthostatic test conditions. The content of K and Na in the erythrocytes and plasma was measured by radioimmunoassay. It is found that the functional capacity of the renin-angiotensin-aldosterone system gradually decreases with age. Some possible mechanisms for the decrease are discussed. I.H.

## A85-20047

**THE RESPIRATORY SINUS ARRHYTHMIA - A MEASURE OF CARDIAC AGE**

W. J. M. HRUSHESKY, D. FADER, O. SCHMITT, and V. GILBERTSEN (Minnesota, University, Minneapolis, MN) Science (ISSN 0036-8075), vol. 224, June 1, 1984, p. 1001-1004. refs

A method developed for quantifying respiratory sinus arrhythmia (RSA) during voluntary cardiorespiratory synchronization relies on computer-assisted rhythmometric cosinor analysis of instantaneous heart rate data. The RSA was present in all subjects tested, even those at advanced ages. The amplitude of the RSA falls approximately 10 percent per decade. An individual with a transplanted heart and one with severe diabetic neuropathy each had resting RSA values that were normal for their ages. The shape and amplitude of the RSA during voluntary cardiorespiratory synchronization may reflect the suppleness of the heart and its response to rhythmically changing intrathoracic pressure and the subsequent ebb-and-flow of venous return. Technology allows objective quantitative assessment of the biologic age of the heart and also the effect of any drug, disease, or behavior that affects the RSA. Author

## A85-20268

**ACQUISITION OF INFORMATION IN CENTRAL VISION AFTER A PERIPHERAL-ACQUISITION TASK - EFFECT OF LOAD FACTOR AND SEAT INCLINATION [PRISE D'INFORMATION EN VISION CENTRALE APRES UNE TACHE D'ACQUISITION PERIPHERIQUE - EFFETS DU FACTEUR DE CHARGE ET DE L'INCLINAISON DU SIEGE]**

J. P. MENU, J. M. SEIGNEUR (Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris, France), A. LEGER, and J. M. CLERE (Centre d'Essais en Vol, Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge, Essonne, France) Medecine Aeronautique et Spatiale, vol. 23, no. 92, 1984, p. 285-287. In French.

The results of visual-pursuit experiments involving six subjects seated at inclinations 20 deg, 45 deg with head upright, and 45 deg with head on headrest and subjected to load factors 1, 3, or 5 G in a centrifuge are reported. The subjects are required to perform a central-vision task, then a peripheral-vision task at eccentricity 45, 90, or 135 deg, and then the central vision task again; the performance of the second task is analyzed. It is found that the initial error in the central-vision task is directly proportional to the eccentricity of the preceding peripheral task, that performance is significantly degraded at 5 G (but not at 3 G) for 20-deg and 45-deg/head-upright seating, but that no significant load-factor-induced change in performance occurs when the head is inclined at 45 deg as well. T.K.

## A85-20269

**EFFECT OF LOAD FACTOR AND SEAT INCLINATION ON THE TIMES OF ACQUISITION FOR PERIPHERALLY PRESENTED TARGETS [EFFET DU FACTEUR DE CHARGE ET DE L'INCLINAISON DU SIEGE SUR LES TEMPS D'ACQUISITION DE CIBLES PRESENTEES EN PERIPHERIE]**

A. LEGER, J. M. CLERE (Centre d'Essais en Vol, Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge, Essonne, France), J. P. MENU, and J. M. SEIGNEUR (Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris, France) Medecine Aeronautique et Spatiale, vol. 23, no. 92, 1984, p. 288-294. In French. refs

The effect of acceleration to load factors 3, 5, or 7 G and of seat inclination 20 deg, 45 deg with head upright, or 45 deg with head on headrest on the performance of a visual acquisition and alignment task at eccentricity 45, 90, or 135 deg is investigated experimentally in six subjects using a centrifuge facility. The results are presented in graphs and characterized, using the time required for acquisition and alignment of a stationary target with a helmet-mounted sight as the primary criterion. It is shown that best performance under practically all conditions is achieved with 45-deg inclination and the head resting on the headrest (thus maintaining normal curvature of the cervical spine). T.K.

## A85-20270

**CHRONOBIOLOGICAL INVESTIGATION OF THREE LONG-HAUL TOURS OF DUTY [TENTATIVE D'EXPLORATION CHRONOBIOLOGIQUE DE TROIS ROTATIONS LONG-COURRIERS]**

J. FUCHEZ, M. LANOOTE, and G. CASANO (Air France, Services Medicaux du Travail, Roissy, Seine-et-Marne, France) Medecine Aeronautique et Spatiale, vol. 23, no. 92, 1984, p. 294-298. In French. refs

The effect of extended flight duty (east-to-west and west-to-east trips around the world lasting 10 and 12 days and a trip from Paris to Japan and back lasting 8 days) on the biorhythms of 12 crew members is investigated. Buccal-temperature, peak-expiratory-flow, and hand-strength measurements and subjective mood and fatigue tests are performed by the crew members themselves during the flight-duty period and for 8 days preceding and following it; the results are presented in a table in the form of acrophase readjustment times. The mean values and standard deviations (in days) are given as 4.4 and 1.76 for temperature, 2.6 and 1.81 for expiratory flow, 3.5 and 1.59 for hand strength, 3.4 and 1.86 for mood, and 2.8 and 1.87 for

subjective fatigue. More serious biorhythm perturbations are noted on the west-to-east portions of the flights. T.K.

#### A85-20271

##### **PARASITE PATHOLOGY AMONG THE PERSONNEL OF AN AIRLINE COMPANY [LA PATHOLOGIE PARASITAIRE CHEZ LE PERSONNEL D'UNE COMPAGNIE AERIENNE]**

J. LAPIERRE (Hopital Cochin, Paris, France), M. PERIN, G. CASANO, L. ABBAS, and J. LAVERNE (Air France, Services Medicaux du Travail, Roissy, Seine-et-Marne, France) *Medecine Aeronautique et Spatiale*, vol. 23, no. 92, 1984, p. 302, 303. In French.

#### A85-20272

##### **LOAD FACTOR AND MODIFICATIONS OF THE ELECTROCARDIOGRAM [FACTEUR DE CHARGE ET MODIFICATIONS DE L'ELECTROCARDIOGRAMME]**

J. M. CLERE, P. LAUGER, J. L. POIRIER, and H. VIEILLEFOND (Centre d'Essais en Vol, Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge, Essonne, France) *Medecine Aeronautique et Spatiale*, vol. 23, no. 92, 1984, p. 304-306. In French. refs

EKG traces obtained before, during, and after 170 20-sec centrifuge accelerations to 4-9 G involving 95 subjects are analyzed. Of the 119 EKGs exhibiting anomalies, 106 have supraventricular perturbations and 13 have ventricular perturbations, and an increase in the occurrence of the first type with increasing load factor is observed. It is concluded that EKG screening is insufficient to predict the load-factor tolerance of candidate pilots. T.K.

#### A85-20273

##### **ARTERIAL HYPERTENSION AMONG THE MEMBERS OF FLIGHT CREWS [L'HYPERTENSION ARTERIELLE CHEZ LES MEMBRES DU PERSONNEL NAVIGANT]**

J. P. BURLATON, M. BELLIER, H. ILLE, N. ALLEGRI, F. DIDELOT, and A. DIDIER (Centre Principal d'Expertise Medicale du Personnel Navigant, Paris, France) *Medecine Aeronautique et Spatiale*, vol. 23, no. 92, 1984, p. 307-314. In French. refs

The results of a retrospective study of the incidence of arterial hypertension among 11,600 flight personnel followed by the Centre Principal d'Expertise Medicale du Personnel Navigant at Paris during 1982-1983 are presented in tables and discussed. A total of 167 cases of AH are classified in terms of permanence (85 percent permanent), patient age in 1982, age at appearance of AH, crew function, associated vascular risk factors, body weight, and treatment (41.9 percent untreated; 12 percent diet/exercise only; 46.1 percent medication). The implications of the findings for flight-crew selection and aptitude are considered. T.K.

#### A85-20274

##### **MOTION SICKNESS - AIR SICKNESS AND SPACE SICKNESS [MAL DES TRANSPORTS - MAL DE L'AIR MAL DE L'ESPACE]**

J. COLIN *Medecine Aeronautique et Spatiale*, vol. 23, no. 92, 1984, p. 316-322. In French.

Air and space sickness and their treatment are characterized in a general review. Consideration is given to the incidence of the conditions among different groups of crew and passengers; laboratory methods for inducing them; the typical symptoms, clinical classifications, and complications; the primary mechanisms involved (mainly discrepancies among vestibular, visual, and otolithic sensory information due to motion or changes in gravitation); preventative measures (selection, training, and simple prophylactic procedures); and drug treatment (scopolamine/amphetamine, ephedrine, antihistamines, and vitamin B6). T.K.

#### A85-20576

##### **MATHEMATICAL MODELS OF THE CIRCADIAN SLEEP-WAKE CYCLE**

M. C. MOORE-EDE, ED. (Harvard University, Boston, MA) and C. A. CZEISLER, ED. (Brigham and Women's Hospital, Harvard University, Boston, MA) New York, Raven Press, 1984, 224 p. For individual items see A85-20577 to A85-20584.

The applications of numerical modelling techniques to the study of the physiological properties of the circadian sleep-wake cycle

are discussed. Consideration is given to: the mutual excitation of damped oscillators and the self-sustainment of circadian rhythms; the mathematical model of circadian rhythmicity; and separate temperature and oscillators as mechanisms of human circadian rhythmicity. Some of the other topics discussed include: the circadian gating of human sleep-wake cycles; a simple stochastic framework for human circadian phenomena; and an analysis of the published records of uncued human sleep-wake cycles. The sleep duration of human subjects during internal desynchronization experiments is also considered. I.H.

#### A85-20579

##### **ARE SEPARATE TEMPERATURE AND ACTIVITY OSCILLATORS NECESSARY TO EXPLAIN THE PHENOMENA OF HUMAN CIRCADIAN RHYTHMS?**

C. EASTMEN (Chicago, University, Chicago, IL) IN: *Mathematical models of the circadian sleep-wake cycle*. New York, Raven Press, 1984, p. 81-101; Discussion, p. 101-103. refs (Contract NIH-MH-4151)

The basic characteristics of the two-oscillator model proposed by Wever (1975 and 1979) to explain spontaneous internal desynchronization in human circadian rhythms are reviewed, and a single-oscillator phase-shift model is proposed. The phase-shift model uses quasi-voluntary behavior, masking, and sleep need as well as a basic circadian oscillation (rather than invoking a separate activity oscillator) to explain divergence from the temperature rhythm. The results of computer simulations and some typical observational data are presented in graphs. T.K.

#### A85-20580

##### **MODELING PRINCIPLES FOR HUMAN CIRCADIAN RHYTHMS**

R. E. KRONAUER (Harvard University, Cambridge, MA) IN: *Mathematical models of the circadian sleep-wake cycle*. New York, Raven Press, 1984, p. 105-127; Discussion, p. 127, 128. refs

Experimental data on the circadian rhythms of free-running human subjects are compiled in tables and graphs and characterized using a reduced-fourth-order model based on two linearly coupled quasi-linear oscillators. Consideration is given to the fundamental variables and their physiological representations, the character of synchrony loss, the mode of action of a light-dark zeitgeber, simple models, and models with periodic zeitgeber excitation. T.K.

#### A85-20581

##### **CIRCADIAN GATING OF HUMAN SLEEP-WAKE CYCLES**

S. DAAN and D. BEERSMA (Groningen, Rijksuniversiteit, Groningen, Netherlands) IN: *Mathematical models of the circadian sleep-wake cycle*. New York, Raven Press, 1984, p. 129-155; Discussion, p. 156-158. refs

A simple model of human sleep/wake cycles is developed on the basis of the single-circadian-oscillator model of Eastman (1980) and the homeostatic regulatory process and empirically estimated parameters of Borbely (1982). Earlier models are reviewed; the homeostatic and circadian aspects of human sleep are examined in the light of various theories; the circadian-gating model is described; the results of both deterministic and stochastic simulations are presented graphically and characterized; and experiments involving manipulation of the sleep cycle are discussed. T.K.

#### A85-20582

##### **LOOKING AT HUMAN CIRCADIAN PHENOMENA FROM A FRAMEWORK OF SIMPLE STOCHASTIC MODELS**

G. DIRLICH (Max-Planck-Institut fuer Psychiatrie, Munich, West Germany) IN: *Mathematical models of the circadian sleep-wake cycle*. New York, Raven Press, 1984, p. 159-185; Discussion, p. 185. refs

The application of mathematical models of stochastic processes to human sleep-wake cycles is investigated. The general properties of stochastic models (storing systems, two-state systems, and alternating-renewal models) are reviewed; the imprecision of the human circadian clock is estimated as about 7 percent on the

basis of published experimental data; a model based on a network of random processes (NORP) and its realization as a computer program are described; and the performance of the NORP is analyzed. It is found that the consecutive cycles of the NORP have durations which are negatively correlated (so that a renewal model cannot describe them), but that the precision of the NORP is greater than the cycle-to-cycle precision of the human circadian clock (suggesting that the single-process imprecision alone is insufficient to explain the observed imprecision of the circadian system). T.K.

**A85-20583****EXPLORATORY DATA ANALYSIS - PUBLISHED RECORDS OF UNCUCED HUMAN SLEEP-WAKE CYCLES**

A.T. WINFREE (Purdue University; Institute for Natural Philosophy, West Lafayette, IN) IN: Mathematical models of the circadian sleep-wake cycle. New York, Raven Press, 1984, p. 187-199; Discussion, p. 199, 200. refs

Published experimental data on human sleep-wake patterns are compiled and analyzed, and the results are compared with the predictions of various proposed circadian-rhythm models. Emphasis is placed on apparent discontinuities in sleep-cycle data which are unexplained or inadequately explained by two-oscillator models such as those of Kronauer et al. (1982) and Wever (1979). An alternative approach assuming a simple dependence of waking time on prior sleep onset, but measuring both with reference to a smoothly varying rhythmic influence (from the circadian temperature clock or from an external zeitgeber) is considered and found to predict the discontinuities of the data while leaving the question of sleep-onset control unanswered. The need for further controlled experiments is indicated. T.K.

**A85-20584****SLEEP DURATION FOR HUMAN SUBJECTS DURING INTERNAL DESYNCHRONIZATION**

J. T. ENRIGHT (California, University, La Jolla, CA) IN: Mathematical models of the circadian sleep-wake cycle. New York, Raven Press, 1984, p. 201-205. refs  
(Contract NSF PCM-77-19949)

Sleep-duration patterns observed in experiments on human subjects are compared with those predicted by coupled-stochastic-system models developed to explain the patterns seen in the responses of diurnal birds and nocturnal rodents to light variations (Enright, 1980). Discontinuities like those observed when human sleep-wake data are plotted with reference to a circadian pattern such as the temperature cycle (Winfree, 1984) are seen when the simulated bird data are plotted in the same way. The possibility that both cognitive effects (including subjective interactions with experimental protocols) and phase shifting of the circadian pacemaker (by self-administered light stimuli during intervals of extended wakefulness) play roles in causing the internal desynchronization observed in humans is considered. T.K.

**A85-20651****THE USE OF CERTAIN INDICATORS OF THE STATUS OF IMMUNOLOGICAL REACTIVITY AND PHYSIOLOGICAL FUNCTIONS FOR ASSESSING THE HEALTH OF A POPULATION [ISPOL'ZOVANIE NEKOTORYKH POKAZATELEI SOSTOIANIIA IMMUNOLOGICHESKOI REAKTIVNOSTI I FIZIOLOGICHESKIKH FUNKTSII DLIYA OTSENKI ZDOROV'IA NASELENIYA]**

V. A. KORNELIUK, N. N. KLEMPARSKAIA, V. S. KOSHCHIEV, and V. I. REZNICHENKO (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1984, p. 8-12. In Russian. refs

**A85-20653****AN INVESTIGATION OF THE DOSE-BIOEFFECT RELATIONSHIP IN LONG-TERM EXPOSURE TO INDUSTRIAL NOISE [IZUCHENIE ZAVISIMOSTI DOZA-BIOEFFEKT DLITEL'NO DEISTVUIUSHCHEGO PROIZVODSTVENNOGO SHUMA]**

V. V. MUKHIN, G. S. ZVEREVA, and A. V. KOLGANOV (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Donetsk, Ukrainian SSR) Gigiena i Sanitariia (ISSN 0016-9900), Aug. 1984, p. 18-21. In Russian. refs

**A85-20661****METHOD FOR ASSESSING THE FUNCTIONAL STATE OF THE SUPPORT-MOTOR SYSTEM IN ATHLETES [METODIKA OTSENKI FUNKTSIONAL'NOGO SOSTAIANIA OPORNO-DVIGATEL'NOGO APPARATA U SPORTSMENOV]**

Z. V. URAZAEVA, I. U. P. DENISENKO, P. V. DUBILEI, and O. A. NOVAK (Volgogradskii Institut Fizicheskoi Kul'tury, Kazan, USSR) Gigiena i Sanitariia (ISSN 0016-9900), Sept. 1984, p. 55-58. In Russian. refs

A functional-state coefficient (FSC) is proposed as a sufficiently objective indicator of the functional state of the support-motor system (SMS) in athletes. The FSC correlates with the pattern of a number of rheographic and biochemical indicators during the diagnostic value of the SMS and makes it possible to use it to assess the efficiency of various drugs for the SMS. B.J.

**A85-20672****HEMODYNAMIC AND ELECTROCARDIOGRAPHIC CHANGES DURING HYPERVENTILATION TESTS IN PATIENTS WITH ARTERIAL HYPERTENSION [GEMODINAMICHESKIE I ELEKTROKARDIOGRAFIЧЕСKIE SDVIGI PRI PROBE S GIPERVENTILIATSIIEI U BOL'NYKH ARTERIAL'NOI GIPERTENZIEI]**

G. A. GLEZER, S. B. STEFANOV, V. G. BILKOV, and D. G. VINOGRADOV (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniyam Khimicheskikh Soedinenii, Moscow, USSR) Sovetskaia Meditsina, no. 6, 1984, p. 13-16. In Russian. refs

**A85-20673****CHANGES IN THE NERVOUS SYSTEM AS A RESULT OF LONG-TERM IMPAIRMENTS OF MOTOR ACTIVITY [IZMENENIIA NERVNOI SISTEMY PRI DLITEL'NOM OGRANICHENII DVIGATEL'NOI AKTIVNOSTI]**

T. N. KRUPINA, KH. KH. IARULLIN, and A. IA. TIZUL Sovetskaia Meditsina, no. 8, 1984, p. 27-31. In Russian. refs

The effect of long-term exposure to clinostatic and anticlinostatic hypokinetic conditions and an immersion medium on the nervous systems of young normal subjects is investigated. Periodic measurements were made of various nervous system parameters by rheoencephalogram and EKG over a period of one year of exposure to the hypokinesia. It is shown that by the second month of hypokinesia, polymorphic functional disorders developed in the adaptive systems of the subjects which resulted in time-dependent clinical impairments of motor function. The data are expected to be useful in the development of a theoretical model for physiological studies of astronauts on long space missions. I.H.

**A85-20674****ECHOCARDIOGRAPHIC INDICATORS OF THE DEFICIENCY OF THE TRICUSPID VALVE [EKHKARDIOGRAFIЧЕСKIE PRIZNAKI NEDOSTATOCHNOSTI TREKHSTVORCHATOGO Klapana]**

L. L. ORLOV, V. A. GOLYZHNIKOV, and N. A. KARLOVA (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Sovetskaia Meditsina, no. 8, 1984, p. 62-64. In Russian. refs

A85-20675

**STATE OF THE VASCULAR TONUS OF THE EXTREMITIES DURING FROSTBITE [SOSTOIANIE SOSUDISTOGO TONUSA KONECHNOSTEI PRI OTMOROZHENIIAKH]**

V. A. ZABOLOTNYKH, I. I. ZABOLOTNYKH, G. N. KLINTSEVICH, I. L. ZYKOV, N. E. MARKINA, S. N. BEZRUCHKO, O. N. SEDUNOVA, and I. A. KOLONTAREVA (Leningradskii Institut Usovershenstvovaniia Vrachei-Ekspertov, Leningrad, USSR) Sovetskaia Meditsina, no. 8, 1984, p. 109-112. In Russian. refs

A85-20684

**MECHANISMS OF BLOOD OXYGENATION DISORDERS IN THE LUNGS AND THEIR CORRECTION [MEKHANIZMY NARUSHENII OKSIGENATSII KROVI V LEGKIKH I IKH KORREKTSIIA]**

M. M. SEREDENKO, T. N. KOVALENKO, V. P. POZHAROV, and E. V. ROZOVA (Akadeiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), July-Aug. 1984, p. 70-72. In Russian. refs

A85-20685

**COEFFICIENTS FOR THE STANDARDIZATION OF GAS VOLUMES [KOEFFITSIENTY DLIA STANDARTIZATSII GAZOVYKH OB'EMOV]**

G. V. KORSHUNOV (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), July-Aug. 1984, p. 82-84. In Russian.

Gas-volume coefficients are used in physiological studies of the lung functions and gas exchange. In the present paper, STPD (standard temperature pressure dry) and BTPS (body temperature pressure saturated) coefficients are calculated for various conditions. B.J.

A85-20686

**INVESTIGATION OF CHEMOTAXIS IN VIVO IN MAN [IZUCHENIE KHEMOTAKSISA IN VIVO U CHELOVEKA]**

A. D. ADO, G. P. BONDAREVA, and G. T. KASHKOVSKAIA (Ministerstvo Zdravookhraneniia SSSR, Institut Immunologii, Moscow, USSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), July-Aug. 1984, p. 84-86. In Russian. refs

A85-20688

**TOPOGRAPHY OF THE INTERNAL-SURFACE RELIEF OF THE WALL OF THE LEFT CARDIAC VENTRICLE IN THE DIASTOLE PHASE [TOPOGRAFIIA REL'EFA VNUTRENNEI POVERKHNOSTI STENKI LEVOGO ZHELUDCHKA SERD TSA V FAZE DIASTOLY]**

F. G. UGLOV, O. P. BOLSHAKOV, F. A. MURSALOVA, A. N. TARASOV, P. I. ORLOVSKII, E. V. LOVIAGIN, O. N. BUSHMARIN, E. F. BELOV, A. L. ZVERKOV (I Leningradskii Meditsinskii Institut, Leningrad, USSR), and V. N. ZUBTSOVSKII (Arkhir Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 87, Sept. 1984, p. 33-41. In Russian. refs

A85-20690

**CHARACTERISTICS OF THE HUMAN MUSCULUS MASSETER UNDER HYPOKINESIA [KHARAKTERISTIKA ZHEVATEL'NYKH MYSHTS CHELOVEKA V USLOVIAKH GIPOKINEZII]**

V. A. SOLOVEV (Kalininskii Meditsinskii Institut, Kalinin, USSR) Arkhir Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 87, Sept. 1984, p. 77-83. In Russian. refs

A85-20696

**NEUTRAL ALPHA-GLUCOSIDASE IN URINE AS A MARKER OF KIDNEY DAMAGE IN HUMANS [NEITRAL'NAIA ALPHA-GLIUKOZIDAZA MOCHI CHELOVEKA KAK MARKER POVREZHDENIIA POCHEK]**

I. S. LUKOMSKAIA, T. P. LAVRENOVA, N. A. TOMILINA, M. L. ZUBKIN, and N. D. FEDOROVA (Akademii Meditsinskikh Nauk SSSR, Institut Biologicheskoi i Meditsinskoi Khimii; Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Transplantologii i Iskusstvennykh Organov, Moscow, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 30, July-Aug. 1984, p. 74-78. In Russian. refs

A85-20701

**ENDOGENOUS ACTIVATION OF PRORENIN IN HYPERTENSIVE DISEASE [OB ENDOGENNOI AKTIVATSII PRORENINA PRI GIPERTONICHESKOI BOLEZNI]**

I. K. SHKHVATSABAIA, I. A. UCHITEL, S. E. USTINOVA, N. A. CHERNOVA, and A. A. NEKRASOVA (Akademii Meditsinskikh Nauk SSSR, Institut Klinicheskoi Kardiologii, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 24, July 1984, p. 48-52. In Russian. refs

Concentrations of inactive (IPR) and active (APR) prorenin were measured in relation to the daily excretion of kallikrein in patients with labile and stable-stage hypertension at rest, following one hour of walking, and in response to prostaglandin injections. The results of the experimental measurements showed an inverse correlation between APR and IPR levels in patients from different subgroups. An inverse correlation was demonstrated between IPR levels and kallikrein excretion in control conditions and following the one-hour walk. The infusion of prostaglandin was found to increase APR levels and decrease IPR levels, leaving the total average renin level unchanged. The level of kidney kallikrein was inversely correlated with IPR levels and directly correlated with APR levels. It is suggested on the basis of the experimental results that kidney kallikrein excretion may play a role in the endogenous activation of renin in hypertensive disease. I.H.

A85-20702

**THE THERAPEUTIC EFFECT OF PRATISOL AND ITS INFLUENCE ON CENTRAL AND PERIPHERAL HEMODYNAMIC PARAMETERS IN PATIENTS WITH HYPERTENSION [LECHEBNIY EFEKT PRATSIOLA I EGO VLIANIE NA POKAZATELI TSENTRAL'NOI I PERIFERICHESKOI GEOMIDINAMIKI U BOL'NYKH GIPERTONICHESKOI BOLEZNIU]**

E. V. ERINA, V. V. PANFILOV, T. N. PROKOPOVA, E. G. DIAKONOVA, and E. V. BELIAKOVA (Akademii Meditsinskikh Nauk SSSR, Institut Klinicheskoi Kardiologii, Moscow, USSR) Kardiologiia (ISSN 0022-9040), vol. 24, July 1984, p. 52-56. In Russian. refs

A85-20703

**A NEW PSYCHOPHYSIOLOGICAL TEST OF INFORMATION TYPE AND ITS POSSIBLE APPLICATIONS IN CARDIOLOGY [NOVYI PSIKHOFIZIOLOGICHESKII TEST 'INFORMATSIONNAIA PROBA' I VOZMOZHNOST' EGO ISPOL'ZOVANIIA V KARDIOLOGII]**

G. I. SIDORENKO, T. A. NECHESOVA, A. I. PAVLOVA, and A. V. FROLOV (Belorusskii Nauchno-Issledovatel'skii Institut Kardiologii, Minsk, Belorussian SSR) Kardiologiia (ISSN 0022-9040), vol. 24, Aug. 1984, p. 63-67. In Russian. refs

A psychophysiological test for determining the efficiency of information processing functions in humans is described. The test is based on television observations of psychoemotional and hypertensive hemodynamic responses. Results from experimental tests in normal subjects and in cardiovascular patients are used to identify the most important test criteria, including the information processing coefficient, and incremental and time-related variations in blood pressure. The test is recommended for the diagnosis of the early stages of arterial hypertension and neurocirculatory dystonia. I.H.

A85-20704

**SYSTEMS-QUANTITATIVE ASSESSMENT OF ADAPTATION TO MUSCULAR WORK IN ATHLETES [SISTEMNO-KOLICHESTVENNAIA OTSENKA PROTSESSA ADAPTATSII K MYSHECHNOI RABOTE U SPORTSMENOV]**

T. S. KILINA (Akademiia Meditsinskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Normal'noi Fiziologii, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1984, p. 24-26. In Russian. refs

A85-20705

**INVESTIGATION OF THE DYNAMICS OF TEMPORAL AND HUMERAL BLOOD PRESSURE IN GYMNASTS IN THE CASE OF DANGEROUS SITUATIONS ARISING DURING THE PERFORMANCE OF EXERCISES ON APPARATUS [ISSLEDOVANIE DINAMIKI VISOCHNOGO I PLECHEVOGO KROVIANOGO DAVLENIIA U GIMNASTOV PRI VOZNIKNOVENII OPASNYYKH SITUATSII VO VREMIA ISPOLNENIIA UPRAZHNIENII NA SNARIADAKH]**

V. V. LIAMIN (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1984, p. 26, 27. In Russian. refs

A85-20707

**THE ROLE OF HORMONES IN THE PROCESS OF LONG TERM ADAPTATION OF THE FEMALE ORGANISM TO HIGH LATITUDE CONDITIONS [GORMONAL'NOE OBESPECHENIE PROTSESSOV DOLGOVREMENNOI ADAPTATSII ZHENSKOGO ORGANIZMA K USLOVIAM VYSOKIKH SHIROT]**

N. V. SHVAREVA (Akademiia Nauk SSSR, Institut Biologicheskikh Problem Severa, Magadan, USSR) Problemy Endokrinologii, vol. 30, July-Aug. 1984, p. 25-31. In Russian. refs

A85-20711

**POPULATION-GENETIC ANALYSIS OF CERTAIN PARAMETERS OF COLOR PERCEPTION [POPULIATSIONNO-GENETICHESKII ANALIZ NEKOTORYKH PARAMETROV TSVETOVOGO VOSPRIIATIIA]**

K. B. BULAEVA and S. A. ISAICHEV Voprosy Psikhologii (ISSN 0042-8841), July-Aug. 1984, p. 107-111. In Russian. refs

A85-20714

**MORPHOLOGY, PATHOGENESIS, AND THE CLASSIFICATION OF THE INTERSTITIAL LUNG DISEASES [MORFOLOGIIA, PATOGENEZ, KLASSIFIKATSIIA INTERSTITSIAL'NYKH ZABOLEVANII LEGKIKH]**

A. I. STRUKOV, V. S. PAUKOV, and O. O. OREKHOV (I Moskovskii Meditsinskii Institut, Moscow, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 46, no. 7, 1984, p. 3-14. In Russian. refs

A85-20715

**THE MORPHOFUNCTIONAL STATE OF LUNG MACROPHAGES ASSOCIATED WITH PHAGOCYTOSIS BY PARTICLES WITH VARIOUS CYTOTOXIC EFFECTS [OSOBENNOSTI MORFOFUNKSIONAL'NOGO SOSTOIANIIA MAKROFAGOV LEGKIKH PRI FAGOTSITOZE CHASTITS RAZLICHNOGO TSITOTOKSICHESKOGO DEISTVIA]**

G. G. KRUGLIKOV, L. G. ROSHCENKO, and T. B. VELICHKOVSKAIA (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) Arkhiv Patologii (ISSN 0004-1955), vol. 46, no. 7, 1984, p. 15-19. In Russian. refs

A85-20716

**CORRELATION BETWEEN ACUTE DISTURBANCES OF BRAIN CIRCULATION AND VARIATIONS OF THE GEOMAGNETIC FIELD [O KORRELIATSIONNOI SVIAZI OSTRYKH NARUSHENII MOZGOVOGO KROVOOBRASHCHENIIA S IZMENENIIAMI MAGNITNOGO POLIA ZEMLI]**

A. V. ZAVIALOV and V. K. DIACHENKO (Kurskii Meditsinskii Institut, Kursk, USSR) Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 84, no. 8, 1984, p. 1137-1140. In Russian. refs

An increase has been observed in the rate of acute cerebral circulation impairments (ACCI) at the onset and at the end of magnetic storm activity, as a result of a statistical analysis of 4023 cases of ACCI in the major cities of the central region of the USSR. The observed increases in ACCI rate occurred at both high and low levels of magnetic field intensity. A regression correlation analysis of the problem is proposed in order to determine the linear characteristics of the magnetic field-ACCI relationship. The results of the regression-correlation analysis are expected to be useful in the development of a medical weather forecast and in the optimization of current methods for the prevention and treatment of cardiovascular disease. I.H.

A85-20717

**A COMPARISON OF EEG AND CAT OBSERVATIONS OF IMPAIRED CEREBRAL CIRCULATION [ELEKTROENTSEFALOGRAFICHESKIE I KOMP'UTERNO-TOMOGRAFICHESKIE SOPOSTAVLENIIA PRI NARUSHENIIAKH MOZGOVOGO KROVOOBRASHCHENIIA]**

N. V. VERESHCHAGIN, V. A. CHUKHROVA, L. K. BRAGINA, S. B. VAVILOV, Z. A. POKROVSKAIA, L. I. SEMINA, and V. S. LOSEV (Akademiia Meditsinskikh Nauk SSSR, Institut Nevrologii, Moscow, USSR) Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova (ISSN 0044-4588), vol. 84, no. 8, 1984, p. 1126-1133. In Russian. refs

The results of EEG and CAT examinations of impaired cerebral circulation in one hundred patients were compared, in order to determine the utility of EEG in topical diagnoses. It is shown that CAT and EEG data were in close agreement (80 percent) when focus was confined to the hemispheres. Discrepancies (of 20 percent) were found between EEG and CAT data in the cases of extensive cerebral hemorrhages; the cases of microfoci lying in the deep portions of the cerebral hemispheres; and the cases of foci in both hemispheres. In the case of circulation impairments in the trunk, EEG and CAT scan data were correlated in only 37 percent of the patients studied. I.H.

A85-20718

**THE AUDIOLOGICAL CHARACTERISTICS OF MENIERES DISEASE ACCORDING TO AUDITORY EVOKED POTENTIALS OF THE BRAIN STEM [AUDIOLOGICHESKAIA KHARAKTERISTIKA BOLEZNI MEN'ERA PO DANNYM REGISTRATSII STVOLOMOZGOVYKH VYZVANNYKH SLUKHOVYKH POTENTIALOV]**

B. M. SAGALOVICH and V. V. KLIMOV (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorka i Nosa, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1984, p. 8-13. In Russian. refs

A85-20719

**A METHOD FOR THE REMOVAL OF ACUTE VESTIBULAR DISTURBANCES [SPOSOB KUPIROVANIYA OSTRYKH VESTIBULIARNYKH RASSTROISTV]**

I. A. SKLIUT and V. B. SHALKEVICH (Belorusskii Nauchno-Issledovatel'skii Institut Nevrologii, Neurokhirurgii i Fizioterapii, Minsk, Belorussian SSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1984, p. 62, 63. In Russian.

The use of caloric stimulation to remove acute vestibular disturbances is described, and illustrated by reference to case studies. The use of concurrent caloric stimulation was found to completely remove the developing labyrinth crisis. Spontaneous nystagmus and dizziness were found to recur in some of the

patients studied after disappearance of the temperature gradient; the reapplication of caloric stimulation reduced the occurrence of this vestibular dysfunction. It is concluded that the proposed treatment is simple and rapid, removing the acute labyrinth attack in a period of 50-90 sec. B.J.

#### A85-20720

**ACUTE COCHLEOVESTIBULAR DYSFUNCTION INDUCED BY A SPASM OF THE INTERNAL-EAR ARTERY [OSTRAIA KOKHLEOVESTIBULIARNAIA DISFUNKTSIIA, VYZVANNAIA SPAZMOM VNUTRENNEI SLUKHOVOI ARTERII]**

IU. V. MITIN and I. A. KRUPYSHEV (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Sept.-Oct. 1984, p. 65, 66. In Russian.

#### A85-20721

**COMPUTER TOMOGRAPHY FOR THE DIAGNOSIS OF DISEASES OF THE LARYNX [KOMP'YUTERNAIA TOMOGRAFIIA V DIAGNOSTIKE ZABOLEVANI GORTANI]**

A. L. KOSSOVOI (Gosudarstvennyi Institut Usovorshenstvovaniia Vrachei, Leningrad, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), July-Aug. 1984, p. 70-74. In Russian. refs

#### A85-20722

**A QUANTITATIVE ASSESSMENT OF THE OCULAR FUNDUS APPLIED TO THE STUDY OF THE PATHOLOGY OF THE OPTIC NERVE [KOLICHESTVENNAIA OTSENKA ELEMENTOV GLAZNOGO DNA PRIMENITEL'NO K IZUCHENIU PATOLOGII ZRITEL'NOGO NERVA]**

T. I. EROSEVSKII and S. IA. BRANCHEVSKAIA (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) Vestnik Oftal'mologii (ISSN 0042-465X), July-Aug. 1984, p. 52-55. In Russian. refs

#### A85-20723

**RESULTS OF AN INVESTIGATION OF THE CORNEAL SENSITIVITY OF ULTRASONIC DEFECTOSCOPE OPERATORS [REZUL'TATY ISSLEDOVANIIA CHUVSTVITEL'NOSTI ROGOVOI OBOLOCHKI U OPERATOROV UL'TRAZVUKOVOI DEFEKTOSKOPII]**

V. P. MOZHERENKOV (Moskovskii Oblastnyi Nauchno-Issledovatel'skii Klinicheskii Institut, Moscow, USSR) Vestnik Oftal'mologii (ISSN 0042-465X), July-Aug. 1984, p. 69, 70. In Russian. refs

#### A85-20724

**METHOD OF SPATIAL-FREQUENCY ANALYSIS AND INVESTIGATION OF THE FREQUENCY-CONTRAST CHARACTERISTICS OF THE EYE UNDER NORMAL CONDITIONS [METOD PROSTRANSTVENNO-CHASTOTNOGO ANALIZA I ISSLEDOVANIE CHASTOTNO-KONTRASTNOI KHARAKTERISTIKI GLAZA V NORME]**

N. V. MAKASHOVA (Ministerstvo Zdravookhraneniia SSSR, Vsesoiuznyi Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR) Vestnik Oftal'mologii (ISSN 0042-465X), July-Aug. 1984, p. 70-73. In Russian. refs

#### A85-20726

**WORK CONDITIONS AND STATUS OF HEALTH OF FEMALE WORKERS IN THE VEGETABLE-GREENHOUSE INDUSTRY (REVIEW OF THE LITERATURE) [USLOVIA TRUDA I SOSTOIANIE ZDOROV'IA RABOTNITS TEPLICHNYKH KHOZIATV /OBZOR LITERATURY/]**

G. V. GOLOVANEVA (Akademii Meditsinskikh Nauk SSSR, Institut Gigieny Truda i Profzabolevani, Moscow, USSR) Gigiena Truda i Profesional'nye Zabolevaniia, Sept. 1984, p. 33-35. In Russian. refs

#### A85-20728

**AN INVESTIGATION OF THE FUNCTIONAL STATE AND WORK QUALITY OF POWER-PLANT OPERATORS DURING WORK OF VARYING INTENSITY [ISSLEDOVANIE FUNKTSIONAL'NOGO SOSTOIANIIA ORGANIZMA I KACHESTVA UPRAVLIAIUSHCHEI DEIATEL'NOSTI OPERATOROV ENERGOBLOKOV PRI RAZLICHNOI INTENSIVNOSTI PROFESSIONAL'NOGO TRUDA]** IU. P. PALTSEV, A. V. KOLESNIKOVA, L. I. LIPKINA, and D. K. FEDOTOV (Moskovskii Nauchno-Issledovatel'skii Institut Gigieny; Vsesoiuznyi Nauchno-Issledovatel'skii Teplotekhnicheskii Institut, Moscow, USSR) Gigiena Truda i Profesional'nye Zabolevaniia, Aug. 1984, p. 37-42. In Russian. refs

#### A85-20729

**THE WORKLOAD OF OPERATORS OF MODERN STEAM POWER PLANTS [NAPRIAZHENOT' TRUDA MASHINISTOV ENERGOBLOKOV SOVREMENNYKH TEPOVYKH ELEKTROSTANTSI]**

A. O. NAVAKATIKIAN, V. A. BUZUNOV, and A. V. KARPENKO (Institut Gigieny Truda i Profzabolevani, Kiev, Ukrainian SSR) Gigiena Truda i Profesional'nye Zabolevaniia, Aug. 1984, p. 42-46. In Russian. refs

#### A85-20730

**FURTHER IMPROVEMENTS IN THE WORK CONDITIONS OF WOMEN [DAL'NEISHEE ULUCHSHENIE USLOVII TRUDA ZHENSCHIN]**

V. N. ARTEMEV and V. L. MOLKOVA (Institut Okhrany Truda, Ivanovo, USSR) Gigiena Truda i Profesional'nye Zabolevaniia, Aug. 1984, p. 59, 60. In Russian.

#### A85-20732

**CURRENT STATUS AND PROSPECTS OF THE APPLICATION OF COMPUTER TECHNIQUES AND MATHEMATICAL METHODS IN THE COMPLEX MEDICAL MONITORING OF ATHLETES [SOSTOIANIE I PERSPEKTIVY PRIMENENIIA VYCHISLITEL'NOI TEKHNIKI I MATEMATICHESKIKH METODOV V KOMPLEKSNOM MEDITSINSKOM KONTROLE SPORTSMENOV]**

V. V. MARKOV (Komitet po Fizicheskoi Kul'ture i Sporty, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1984, p. 19-21. In Russian.

#### A85-20734

**EFFECT OF TRANSMERIDIONAL TRAVEL ON THE ADAPTATION DYNAMICS OF THE FATTY-ACID COMPOSITION OF THE BLOOD PLASMA IN HEALTHY PEOPLE [O VLIANII TRANSMERIDIONAL'NOGO PEREEZDA NA ADAPTATSIONNIU DINAMIKU ZHIRNO-KISLOTNOGO SOSTAVA PLAZMY KROVI U ZDOROVYKH LIUDEI]**

V. N. IVANOV, V. D. AKHMETOV, O. A. DEMIDOV, and A. A. LAVRENTEVA (Chitinskii Meditsinskii Institut, Chita, USSR) Voprosy Pitaniia (ISSN 0042-8833), July-Aug. 1984, p. 26-29. In Russian. refs

#### A85-20736

**OPTOKINETIC NYSTAGMUS - METHODS OF STUDY AND DIAGNOSTIC VALUE [OPTOKINETICHESKII NISTAGM - METOD ISSLEDOVANIIA I DIAGNOSTICHESKOE ZNACHENIE]**

V. G. BAZAROV and L. A. SAVCHUK (Kievskii Nauchno-Issledovatel'skii Institut Otolaringologii, Kiev, Ukrainian SSR) Zhurnal Ushnykh, Nosovykh i Gorlovykh Boleznei (ISSN 0044-4650), July-Aug. 1984, p. 81-85. In Russian. refs

#### A85-20836

**THE RELATIONSHIP OF POTASSIUM AND SODIUM CONTENT, ATPASE ACTIVITY, AND ATP CONTENT IN THE BLOOD OF BURN VICTIMS [SVIAZ' MEZHDU KONTSENTRATSIEI KALIIA I NATRIIA, ATFAZNOI AKTIVNOST'IU I SODERZHANIEM ATF V KROVI U BOL'NYKH OZHGOVOI BOLEZN'IU]**

A. M. MOROZ, V. G. BIK, E. A. IURMIN, and M. A. IUNKO (L'vovskii Meditsinskii Institut, Lvov, Ukrainian SSR) Patologicheskaia Fiziologiya i Eksperimental'naia Terapiia (ISSN 0031-2991), no. 6, Nov.-Dec. 1984, p. 31-34. In Russian. refs



**A85-21114****PERIPHERAL BLOOD FLOW DURING REWARMING FROM MILD HYPOTHERMIA IN HUMANS**

G. K. SAVARD, K. E. COOPER, W. L. VEALE, and T. J. MALKINSON (Calgary, University, Calgary, Alberta, Canada) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 4-13. Research supported by the Medical Research Council of Canada and Alberta Heritage Foundation for Medical Research. refs

Limb and extremity blood flow was measured in six men and women during rewarming from mild hypothermia, in order to confirm the hypothesis of Burton et al. (1955) that vasodilation is induced by surface heating in the initial stages of hypothermia. Measurements of hand blood flow were made by calorimetry, and measurements of blood flow in the forearm, calf and foot were made by strain gauge venous occlusion plethysmography at a rest temperature of 22 C and during rewarming. A small increase was found in skin blood flow in the falling phase of core temperature upon rewarming in a warm bath. No increase was observed in foot blood flow upon rewarming in warm air. On the basis of the above results, it is concluded that the after-drop in core temperature during rewarming from mild hypothermia does not result from a large vasodilation in the superficial parts of the periphery. The possible contributions of mechanisms of heat conduction, heat convection, and cessation of shivering thermogenesis is discussed. I.H.

**A85-21115****BILATERAL PHRENIC STIMULATION - A SIMPLE TECHNIQUE TO ASSESS DIAPHRAGMATIC FATIGUE IN HUMANS**

M. AUBIER, D. MURCIANO, Y. LECOQUIC, N. VIRES, and R. PARIENTE (Institut National de la Sante et de la Recherche Medicale; Hopital Beaujon, Clichy, Hauts-de-Seine, France) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 58-64. refs

Measurements of transdiaphragmatic pressure (Pdi) and diaphragm relaxation rate were obtained during single-switch stimulation of both phrenic nerves in six normal subjects. Stimulation was produced by needle electrodes with square wave impulses of 0.1 ms at 1 Hz. On the basis of the measurements, it is found that: after diaphragmatic fatigue, peak Pdi decreased by an average of 45 percent; and relaxation rate increased from about 55.2 ms to about 75 ms five minutes after the test run. It is concluded on the basis of the experimental results that bilateral phrenic stimulation is an effective and painless method for detecting diaphragmatic fatigue, and that the observed decrease in diaphragmatic strength following fatigue appears to be a long lasting effect. I.H.

**A85-21117****EFFECTS OF DEHYDRATION ON THE VASOPRESSIN RESPONSE TO IMMERSION**

H. VON AMELN, M. LANIADO, L. ROECKER, and K. A. KIRSCH (Berlin, Freie Universitaet, Berlin, West Germany) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 114-120. Research supported by the Bundesinstitut fuer Sportwissenschaft Koeln; Bundesministerium fuer Forschung und Technologie Bonn. refs  
(Contract BMFT-01-QV-327-ZA/WF/WRK-2755)

The role of central blood volume engorgement and hypoosmolality in the response of vasopressin to water immersion in dehydrated subjects is investigated experimentally. Thermal dehydration was induced over a period of 4 hr and was followed by water immersion and chair rest. The test subjects included nine healthy normal men and women aged 22-31 yr. It is found that prolonged heat exposure resulted in a body weight loss of 3.5 percent. Plasma osmolality increased by 5 mosmol/kg, and mean arterial pressure decreased from 85 to 78 mmHg. Body temperature increased from 36.8 to 38.6 C. As a result of the combined action of hypertonicity, hypovolemia, hypotension, and hypothermia, plasma vasopressin increased from 2.1 to 8.1 pg/ml after 4 hr thermal dehydration. During chair rest, however, plasma vasopressin levels remained elevated at 8.4 pg/ml. On the basis

of the above results it is concluded that central hypervolemia and not hypotonicity is the primary stimulus for vasopressin suppression during water immersion in dehydrated subjects. I.H.

**A85-21118\* Texas Univ. Health Science Center, Dallas.****ROLE OF MUSCLE MASS AND MODE OF CONTRACTION IN CIRCULATORY RESPONSES TO EXERCISE**

S. F. LEWIS, P. G. SNELL, W. A. PETTINGER, C. G. BLOMQUIST (Texas, University, Health Science Center, Dallas, TX), W. F. TAYLOR (Texas, University, San Antonio; Texas, University, Health Science Center, Dallas, TX), M. HAMRA (Oklahoma, University, Oklahoma City, OK; Texas, University, Health Science Center, Dallas, TX), and R. M. GRAHAM (Massachusetts General Hospital, Boston, MA; Texas, University, Health Science Center, Dallas, TX) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 146-151. refs

(Contract NIH-HL-17669-08; NIH-HL-06296; NSG-9026)

The roles of the mode of contraction (dynamic or static) and active muscle mass in determining the cardiovascular response to exercise has been investigated experimentally in six normal men. Exercise consisted of static handgrip and dynamic handgrip exercise, and static and dynamic knee extension for a period of six minutes. Observed increases in mean arterial pressure after exercise were similar for each mode of contraction, but larger for knee extension than handgrip exercise. Cardiac output increased more for dynamic than for static exercise and for each mode more for knee exercise than for handgrip exercise. Systemic resistance was found to be lower for dynamic than for static exercise, and to decrease from resisting levels by about one third during dynamic knee extension. It is shown that the magnitude of cardiovascular response is related to active muscle mass, but is independent of the contraction mode. Equalization of cardiovascular response was achieved by proportionately larger increases in cardiac output during dynamic exercise. The complete experimental results are given in a table. I.H.

**A85-21119****EPINEPHRINE, NOREPINEPHRINE, AND DOPAMINE DURING A 4-DAY HEAD-DOWN BED REST**

J. M. PEQUIGNOT, A. GUELL, G. GAUQUELIN, E. JARSAILLON, G. ANNAT, A. BES, L. PEYRIN, and C. GHARIB (Lyon I, Universite, Lyon; CNRS; Centre Hospitalier Universitaire de Rangueil, Toulouse, France) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 157-163. Research supported by the Universite de Lyon I; Direction des Recherches, Etudes et Techniques and Centre National d'Etudes Spatiales. refs  
(Contract DRET-84-86; CNES-83-85)

The dynamic characteristics of sympathoadrenal activity (epinephrine, norepinephrine and dopamine) in men was investigated during head-down bed rest at an angle of six degrees. The bed rest experimental model was designed to simulate the effects of microgravity, i.e., the shift of body fluids from the lower to the upper part of the body. Sympathoadrenal activity was determined by periodic measurements of epinephrine, norepinephrine, and dopamine levels in the plasma and urine of the test subjects at periodic intervals over the course of four days. It is found that: catecholamine (CA) and methoxylated metabolite levels were unchanged throughout the experiment; maximal changes in plasma occurred on the second day; and heart rate decreased from 71 to 63 per min. On the basis of the experimental results, it is concluded that there is no clear relationship between sympathoadrenal function and the stimulation of cardiopulmonary receptors or neuroendocrine changes induced by hypervolemia during head-down bed rest. I.H.



**A85-21122****INFLUENCES OF AGE AND GENDER ON HUMAN THERMOREGULATORY RESPONSES TO COLD EXPOSURES**

J. A. WAGNER and S. M. HORVATH (California, University, Santa Barbara, CA) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 180-186. refs

(Contract AF-AFOSR-78-3534; NIH-AG-01030; NIH-RR-07099-15)

The age-related and gender-related differences in thermoregulatory responses to cold temperatures have been studied experimentally in four groups of women and men between the ages of 20 and 72 years. The test subjects were exposed to room temperatures of between 10 and 28 C at 40 percent relative humidity for periods of up to two hours. An increase was observed in the metabolic rate (ml/kg lean body mass/min) for all four groups. The group of older women showed greater rate of metabolic increase (40 percent in 15 min) than either the group of young men, the group of young women, or the group of older men. A similarly rapid increase in metabolic response was found for older women at a temperature of 15 C. Some additional relationships between rectal temperature and skin temperature measurements for the four groups are discussed in detail. On the basis of the above results, it is suggested that the group of older men (aged 51-72 years) were the most susceptible to cold. I.H.

**A85-21123****CARDIOVASCULAR REACTIONS TO COLD EXPOSURES DIFFER WITH AGE AND GENDER**

J. A. WAGNER and S. M. HORVATH (California, University, Santa Barbara, CA) *Journal of Applied Physiology* (ISSN 0161-7567), vol. 58, Jan. 1985, p. 187-192. refs

(Contract AF-AFOSR-78-3534; NIH-AG-01030; NIH-RR-07099-15)

**A85-21651****POSSIBILITIES OF THE EMERGENCY RESTORATION OF THE WORK CAPACITY OF OPERATOR SPECIALISTS [VOZMOZHNOSTI EKSTRENNOGO VOSSTANOVLENIIA RABOTOSPOSOBNOSTI SPETSIALISTOV OPERATORSKOGO PROFILIIA]**

G. L. APANASENKO and N. I. MEZHERITSKII *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Oct. 1984, p. 38, 39. In Russian.

The paper examines techniques that can be used for the rapid restoration of the work capacity of operators during emergencies (e.g., acute military situations). It is shown that hyperbaric oxygenation has a positive effect on restoration processes in the organism and can be used as a means for the urgent removal of fatigue or the improvement of the work capacity of operators. B.J.

**A85-21652****MAIN RESEARCH TRENDS IN MEDICAL SUPPORT FOR FLIGHT SAFETY [OSNOVNYE NAPRAVLENIIA ISSLEDOVANIYA V OBLASTI MEDITSINSKOGO OBESPECHENIIA BEZOPASNOSTI POLETOV]**

S. A. GOZULOV *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Oct. 1984, p. 40-42. In Russian.

**A85-21653****STATE OF THE METABOLISM IN SEAMEN DURING VOYAGES [SOSTOIANIE OBMENA VESHCHESTV U MORIAKOV V PLAVANII]**

A. S. SOLODKOV *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Oct. 1984, p. 42-45. In Russian. refs

The paper reports a study of the protein, carbohydrate, lipid, and electrolyte metabolisms, and of the acid-base state and hormone-enzyme status in 75 seamen before, during, and after prolonged voyages at low latitudes. A statistical analysis shows that prolonged voyages result in changes in the activity of neurohumoral mechanisms, directed toward the biochemical provision of energy for adaptive reactions. B.J.

**A85-21721****FEATURES CHARACTERIZING CHANGES IN HUMAN WORK CAPACITY IN EXTREME CONDITIONS [NEKOTORYE OSOBENNOSTI IZMENERIIA RABOTOSPOSOBNOSTI CHELOVEKA V EKSTREMAL'NYKH USLOVIIAKH]**

I. D. KUDRIN, Z. K. SULIMO-SAMUILLO, and V. A. SHABALIN *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Nov. 1984, p. 38-40. In Russian. refs

**A85-21722****ENHANCEMENT OF THE WORK CAPACITY OF PILOTS BY THE CONTROL OF PSYCHOPHYSIOLOGICAL CONDITION [POVKYSHENIE RABOTOSPOSOBNOSTI LETCHIKA PUTEM UPRAVLENIIA EGO PSIKHOFIZIOLOGICHESKIM SOSTOIANIEM]**

S. G. MELNIK and A. V. SHAKULA *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Nov. 1984, p. 41-44. In Russian. refs

Two techniques for improving pilot work capacity are examined: (1) a biofeedback method using psychosomatic self-regulation based on the principle of autogenic training; and (2) programmed control using electrostimulation of the neuromuscular system. The psychosomatic self-regulation method is shown to be an effective technique for the operational control of the psychophysiological condition of pilots during long flights. Neuromuscular electrostimulation is shown to reduce muscular discomfort, contribute to an improvement of mental work capacity by 30-40 percent, and reduce fatigue and the physiological 'cost' of work. B.J.

**A85-21723****EFFECT OF GRADED PHYSICAL LOADS ON THE CONDITION OF REDOX PROCESSES IN SEAMEN [VLIANIE DOZIROVANNYKH FIZICHESKIKH NAGRUZOK NA SOSTOIANIE OKISLITEL'NO-VOSSTANOVITEL'NYKH PROTSESSOV ORGANIZMA MORIAKOV]**

V. G. ALTUKHOV, L. A. MOROZOV, V. L. MAKAROV, and V. V. DOLGOV *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Nov. 1984, p. 44-47. In Russian. refs

**A85-21724****INDICES OF CENTRAL HEMODYNAMICS AND THE CONTRACTILE CAPABILITY OF THE MYOCARDIUM IN HEALTHY PERSONS DURING PHYSICAL EXERCISE [POKAZATELI TSENTRAL'NOI GEMODINAMIKI I SOKRATITEL'NOI SPOSOBNOSTI MIOKARDA U ZDOROVYKH LITS PRI FIZICHESKOI NAGRUZKE]**

M. D. MOMOT and N. K. USACHEV *Voenno-Meditsinskii Zhurnal* (ISSN 0026-9050), Nov. 1984, p. 53, 54. In Russian. refs

**A85-21773\*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**DYNAMICAL RELATIONS FOR LEFT VENTRICULAR EJECTION - FLOW RATE, MOMENTUM, FORCE AND IMPULSE**

L. H. BACK, R. H. SELZER (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), D. G. GORDON (Southern Cardiology, P.A., Birmingham, AL), D. C. LEDBETTER (California Institute of Technology, Jet Propulsion Laboratory, Pasadena; Informatics, Inc., Palo Alto, CA), and D. W. CRAWFORD (Southern California, University, Los Angeles, CA) *ASME, Transactions, Journal of Biomechanical Engineering*, vol. 106, Feb. 1984, p. 54-61. refs

(Contract NAS7-100)

An investigation was carried out to quantitatively evaluate left ventricular volume flow rate, momentum, force and impulse derived from application of conservation principles for mass and momentum of blood within the ventricle during the ejection phase. An automated digital image processing system was developed and applied to left ventricular angiograms which are computer processed and analyzed frame by frame to determine the dynamical relations by numerical methods. The initial experience with force and impulse has indicated that neither quantity seemed to be a sensitive indicator of coronary artery disease as evaluated by qualitative angiography for the particular patient group studied.

Utilization of the dynamical relations in evaluating human left ventricular performance requires improved means of measurement and interpretation of clinical studies. Author

**A85-22117**

**THE TOPOGRAPHY OF ELECTRIC POTENTIALS IN THE HUMAN BRAIN AND DOMINANCE [TOPOGRAFIYA ELEKTRICHESKIKH POTENTSIALOV MOZGA CHELOVEKA I DOMINANTA]**

V. A. DOROSHENKO (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 70, Oct. 1984, p. 1361-1365. In Russian. refs

Early and late contingent negative variations (CNVs) in electric potentials have been observed during reaction time and stimulus recognition experiments. The subjects of the experiments were seven men and seven women aged between 18 and 20 years. It is shown that the topography of electric potentials in the brain appears to reflect the dominant structure of intracerebral relationships, as determined by a performed task. I.H.

**A85-22118**

**THE PROBLEM OF THE FUNCTIONAL SIGNIFICANCE OF CERTAIN EEG PARAMETERS AND THE PRINCIPLE OF DOMINANCE [PROBLEMA FUNKTSIONAL'NOI ZNACHIMOSTI NEKOTORYKH EEG-POKAZATELEI I PRINTSIP DOMINANTY]**

I. E. KANUNIKOV and A. R. SHARIPOV (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 70, Oct. 1984, p. 1366-1373. In Russian. refs

The contingent negative variation (CNV) EEG parameters in humans performing four different tasks has been investigated experimentally, in order to confirm the dominance principle established by Ukhomskii (1966). On the basis of a factor analysis of EEG data, it is shown that CNVs have a complicated spatial-temporal structure and can be characterized according to four relatively independent components which differ from each other with respect location in the brain; time of development and sensitivity to variations in monitored variables. I.H.

**A85-22152#**

**HEAT STRESS IN AVIATION AT JAMNAGAR - FIELD STUDY**

M. W. MALSE *Aviation Medicine*, vol. 28, June 1984, p. 21-32. refs

The heat stress of combat aircraft pilots was evaluated during eight low-level and 12 medium-level sorties in T-96/69 aircraft. Crewroom and cockpit temperatures were measured by whirling psychrometer in both dry-bulb and wet-bulb modes. Thermal strain was determined using parameters for skin temperature, oral temperature, heart rate, and sweat loss. The measurements showed a significant increase in mean skin temperature during the low-level sorties. The mean dehydration level was 1 percent of body weight during the low-level sorties, and 0.9 percent during medium-level sorties. On the basis of the physiological evaluation, the following recommendations are made: (1) aircraft cockpits should be covered with tarpaulins between sorties; (2) crewroom and on-request reporting points (ORPs) should be air-conditioned; and (3) periodic checks of the onboard air-conditioning systems should be performed during the summer months. Adequate replacement fluids for rehydration, and liquid-cooled flight suits are also recommended. I.H.

**A85-22153#**

**PROBLEMS IN AERO-MEDICAL EVALUATION. II - SOME CASES OF ECG DIAGNOSIS OF ASYMPTOMATIC IHD REVIEWED**

K. V. S. MANI, N. RATTAN, G. S. NAYAR, A. S. KASTHURI, and M. RAJ (Indian Air Force, Directorate of Medical Services, New Delhi, India) *Aviation Medicine*, vol. 28, June 1984, p. 33-38. refs

The results of individual medical evaluations are reviewed in order to determine the causes of false-positivity in stress-ECG examinations. The examinations were performed during a 15 year survey of the flight fitness of military and civilian aircrews in India. Data from medical dossiers were compared with the results of

follow-up examinations, and individuals with asymptomatic types of coronary heart disease (CAD) were screened in order to find false positives. On the basis of the compared data, it is recommended that the stress-ECG not be used as the decisive medical test of the flight eligibility of aircrew members with CAD; individuals showing results positive for CAD on ECG-stress tests should be subjected to radionuclide imaging to corroborate the ECG results. I.H.

**A85-22154#**

**CORRELATION OF THE BREATH AND BLOOD ALCOHOL LEVELS WITH TASK PERFORMANCE**

S. K. ADAVAL (Indian Air Force, Command Hospital, Bangalore, India) *Aviation Medicine*, vol. 28, June 1984, p. 49-53. refs

In order to determine an optimum performance level for aircraft pilots following ingestion of alcohol, a series of psychomotor examinations were performed. Measurements of alcohol concentration were carried out by gas chromatography, and the battery of psychomotor tests included: a flight-oriented psychomotor test; a critical fusion frequency test; a choice-reason time test; and an attention stability test. The results of the tests show that even 12 hours after ingestion, decrements in operational performance remained. When blood alcohol was reduced to zero, some impairment of performance was observed. I.H.

**A85-22155#**

**PATHOGENESIS, CLINICAL COURSE, COMPLICATIONS AND TREATMENT OF IMPAIRED GLUCOSE TOLERANCE - CURRENT CONCEPTS**

S. M. OSAMA (Air Force Central Medical Establishment, New Delhi, India) *Aviation Medicine*, vol. 28, June 1984, p. 58-63. refs

**A85-22156#**

**ANALYSIS OF CASES OF GTT ABNORMALITY**

G. S. GANDHI (Air Force Hospital No. 7, India) *Aviation Medicine*, vol. 28, June 1984, p. 64-71.

Case documents and medical board proceedings of 172 aircraft personnel with GTT abnormalities are analyzed, in order to derive an epidemiological profile of glucose intolerance. The effects of diet, hypoglycemic agents and weight reduction programs on GTT abnormalities over a period of four years was also investigated. It is shown that out of a total of 172 cases of GTT abnormality, 71 percent were diagnosed as diabetes mellitus, and 29 percent as impaired glucose tolerance (IGT). Among aircrews the incidence of IGT was greater than among ground duty officers. A total of 83 percent of the cases were asymptomatic and were detected during routine medical check-ups. In overweight individuals, 54 percent were effectively treated by diet restrictions and weight reduction alone. Among ground duty officers, 32 were upgraded to a higher medical category following treatment, and 35 aircrew members were returned to active flight duty within two years. The results of the analysis are given in a table. I.H.

**A85-22157#**

**ANALYSIS OF CASE OF DIABETES MELLITUS AMONGST COMMERCIAL CIVIL AIRCREW**

G. S. NAYAR (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) *Aviation Medicine*, vol. 28, June 1984, p. 72-78. refs

The problem of carbohydrate intolerance among members of civilian aircrews in India is examined. The data used in the analysis include medical records of all civil flying license holders in India between 1969 and 1983. Records of aircrew members which showed evidence of impaired glucose tolerance (IGT) were analyzed with respect to: the success of treatments for the disorder; and the compatibility of the diagnosis with WHO diagnostic criteria. It is found that 145 aircrew in India were diagnosed as having glucose intolerance at least once. At least 27 percent of this group were permanently withdrawn from active duty due to diabetes mellitus. In 42 percent of the cases, related conditions such as CAD, hypertension, and lenticular opacities were also found. On the basis of the analyzed data, recommendations are offered with

respect to education programs for those aircrew members currently under self-treatment regimens. I.H.

#### A85-22158#

##### FATAL AIRCRAFT ACCIDENT - A CASE REPORT

B. SINGH (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) Aviation Medicine, vol. 28, June 1984, p. 79-82. refs

A case report of a fatal aircraft accident is presented. The accident involved the test flight of a jet trainer aircraft developed for the Indian Air Force. The complete flight history of the aircraft is reviewed, and the results of a medical examination of the remains of the pilot are given. It is concluded that the accident was most probably the result of: (1) a substandard air-pressurization system which exposed the pilot to an hypoxic air mixture at the aircraft's last reported altitude of 37,000 feet; and (2) the failure of the pilot to ensure that a backup supply of oxygen was available. Recommendations are offered with respect to more rigorous preflight checks of pressurization systems and backup oxygen supplies. I.H.

#### A85-22501

##### AN EXPERIMENTAL INVESTIGATION OF THE BLOOD RELATIVES OF GLAUCOMA PATIENTS [OPYT OBSLEDOVANIYA RODSTVENNIKOV PROBANDOV BOL'NYKH GLAUKOMOI]

V. V. VOLKOV and V. V. VOLKANESKU Vestnik Oftal'mologii (ISSN 0042-465X), Sept.-Oct. 1984, p. 18-21. In Russian. refs

#### A85-22502

##### PHYSIOLOGICAL FOUNDATIONS OF THE HEALTH-PRODUCING EFFECT OF PHYSICAL TRAINING [FIZIOLOGICHESKIE OSNOVY OZDOROVITEL'NOGO EFFEKTA FIZICHESKOI TRENIROVKI]

A. A. VIRU (Tartuski Gosudarstvennyi Universitet, Tartu, Estonian SSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 16-19. In Russian. refs

#### A85-22503

##### EXPERIMENTAL VALIDATION OF THE NECESSITY OF THE CORRECTION OF THE DIET OF ATHLETES UNDER INTENSE THERMAL AND PHYSICAL LOADS [EKSPERIMENTAL'NOE OBOSNOVANIE NEOBKHOZIMOSTI KORREKTSII RATSIONA SPORTSMENOV PRI INTENSIVNYKH TEPLOVYKH I FIZICHESKIKH NAGRUZKAKH]

IU. A. IVANOV and A. K. SAPORBEKOVA (Voenno-Meditsinskaya Akademiia, Leningrad, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 19, 20. In Russian.

#### A85-22505

##### EFFECT OF STRENUOUS MUSCULAR WORK ON THE HEMATOLOGICAL INDICATORS IN ATHLETES [VLIANIE NAPRIAZHENNOI MYSHECHNOI RABOTY NA GEMATOLOGICHESKIE POKAZATELI SPORTSMENOV]

N. I. VOLKOV, ZH. I. KARPOVA, N. G. MIKESHINA, E. N. MOKHOVA, I. A. SAVELEV, and L. M. IAMUTOVA (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 22-24. In Russian. refs

#### A85-22506

##### DIURNAL VARIABILITY OF THE VELOCITY-FORCE COMPONENTS OF THE MOTOR FUNCTION [VARIATIVNOST' DVIZHENII SKOROSTNO-SILOVOGO KHARAKTERA V TECHENIE DNIA]

I. A. ZUEVA (Krasnodarskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Krasnodar, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 26. In Russian.

#### A85-22507

##### DYNAMICS OF CHANGES OF PERIPHERAL-BLOOD LEUCOCYTES AFTER PHYSICAL EXERCISE IN UNTRAINED PERSONS [DINAMIKA IZMENENII LEIKOTSITOV PERIFERICHESKOI KROVI POSLE FIZICHESKOI NAGRUZKI U NETRENIROVANNYKH LITS]

N. S. VINICHENKO, V. I. DURNEV, V. I. OVCHARENKO, and V. P. LIAPIN (Voroshilovgradskii Meditsinskii Institut, Voroshilovgrad, Ukrainian SSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 26. In Russian.

#### A85-22508

##### EFFECTIVENESS OF VESTIBULAR TRAINING WITH ALLOWANCE FOR THE STRENGTH OF THE NERVOUS SYSTEM OF YOUNG GYMNASTS [EFFEKTIVNOST' VESTIBULIARNOI TRENIROVKI S UCHETOM SILY NERVNOI SISTEMY IUNYKH GIMNASTOV]

V. A. ZOLOTUKHIN (Smolenskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Smolensk, USSR) and A. M. SHLEMIN (Akademiia Pedagogicheskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Fiziologii Detei i Podrostkov, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 27, 28. In Russian. refs

A two-step pedagogical experiment was conducted to ascertain if certain negative results of the vestibular training of young gymnasts can be eliminated by taking into account the nervous-system strength (NSS) of the gymnasts. The first step involved a study of the effect of the same magnitude of training load on the development of vestibular stability in persons with different NSSs. The second step involved the investigation of the effect of different magnitudes of training load on the development of vestibular stability in persons with weak, medium, and strong nervous systems. It is concluded that vestibular training with graded loads assures (when individual differences in the NSSs of young gymnasts are taken into account) a unidirectional positive effect in the development of vestibular stability with respect to both vegetative and somatic responses. B.J.

#### A85-22509

##### INDICATORS OF THE CARDIOVASCULAR SYSTEM DEPENDING ON AGE, THERAPEUTIC-RUNNING DISTANCE, AND THE DURATION OF THE TIME PERIOD IN WHICH THIS FORM OF THERAPY IS APPLIED [NEKOTORYE POKAZATELI SERDECHNO-SOSUDISTOI SISTEMY V ZAVISIMOSTI OT VORZRASTA, DISTANTSII I PRODOLZHITEL'NOSTI ZANIATII OZDOROVITEL'NYM BEGOM]

V. P. MISHCHENKO, E. L. EREMINA, and P. I. GUBKA (Poltavskii Meditsinskii Stomatologicheskii Institut, Poltava, Ukrainian SSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 37-39. In Russian. refs

#### A85-22510

##### RATIONAL COMBINATION OF DRUGS IN SPORTS MEDICINE (REVIEW OF THE LITERATURE) [RATSIONAL'NOE KOMBINIROVANIE LEKARSTVENNYKH SVEDSTV, ISPOL'ZUEMYKH V SPORTIVNOI MEDITSINE /OZBOR LITERATURY/]

N. P. BYKOV and L. V. KRIUKOVA (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 40-43. In Russian. refs

A survey of the literature is used to examine the possible consequences of the combined administration of various drugs in sports medicine. A table is presented listing the main types of the interaction of drugs and the organism: drug incompatibility, synergism, synergism-antagonism, paradoxical interference, and the interaction between drugs and nonpharmacological factors. B.J.

A85-22511

**THE SIGNIFICANCE OF STRENGTH BUILDING IN THE PHYSICAL EDUCATION OF FEMALE STUDENTS [ZNACHENIE SILOVOI PODGOTOVKI V FIZICHESKOM VOSPITANII STUDENTOK]**

I. V. ZABAVNIKOVA and A. P. ZABAVNIKOV (Kolomenskii Pedagogicheskii Institut, Kolomna, USSR) *Teoriia i Praktika Fizicheskoi Kul'tury* (ISSN 0040-3601), Sept. 1984, p. 51. In Russian.

A85-22512

**SECOND ALL-UNION SYMPOSIUM ON PREDICTION AND APPLIED PHYSIOLOGY [II VSESOIUZNYI SIMPOSIUM PO PROGNOZIROVANIU I PRIKLADNOI FIZIOLOGII]**

A. G. ZARIFIAN (Kirgizskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Frunze, Kirgiz SSR) and D. N. DAVIDENKO (Leningradskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) *Teoriia i Praktika Fizicheskoi Kul'tury* (ISSN 0040-3601), Sept. 1984, p. 61, 62. In Russian.

The proceedings of the All-Union Symposium on the Assessment and Prediction of Functional States of the Organism in Applied Physiology, held May 15-17 in Frunze, are briefly described. Papers presented considered such topics as the mobilization of functional reserves during adaptation to training and competition loads; factors determining and limiting work capacity; shifts in the main functional systems; and methods for the assessment and prediction of the functional states of athletes. B.J.

A85-22513

**THE HEALTHY PERSON AND HIS FUNCTIONAL RESERVES [ZDOROVYI CHELOVEK I EGO FUNKSIONAL'NYE REZERVY]**

N. A. SUROVTSEV *Teoriia i Praktika Fizicheskoi Kul'tury* (ISSN 0040-3601), Sept. 1984, p. 63. In Russian.

A85-22521

**THE ROLE OF COMPREHENSIVE ASSESSMENT OF THE SIZE OF A CARDIAC MUSCLE NECROSIS IN THE PROGNOSIS AND TREATMENT OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION [ZNACHENIE KOMPLEKSNOI OTSENKI VELICHINY NEKTROZA SERDECHNOI MYSHTSY DLIA PROGNOZA I LECHENIIA BOL'NYKH OSTRYM INFARKTOM MIOKARDA]**

E. I. ZHAROV, S. N. SALNIKOVA, and A. L. VERTKIN (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR) *Kardiologiya* (ISSN 0022-9040), vol. 24, Sept. 1984, p. 39-44. In Russian. refs

A85-22522

**BICYCLE ERGOMETRY TESTING IN THE DIAGNOSIS OF CORONARY HEART DISEASE IN WOMEN IN COMPARISON WITH SELECTIVE CORONARY ANGIOGRAPHY DATA [VELOERGOMETRICHESKAIA PROBA V DIAGNOSTIKE ISHEMICHESKOI BOLEZNI SERDTSA U ZHENSCHIN /SRAVNENIE S DANNYMI SELEKTIVNOI KORONAROGRAFII/]**

B. A. SIDORENKO, A. A. LIKISHCHEV, N. M. AKHMEDZHANOV, L. S. MATVEEVA, V. P. MAZAEV, and A. M. KRASNOSELSKII (Akademiia Meditsinskikh Nauk SSSR, Institut Klinicheskoi Kardiologii, Moscow, USSR) *Kardiologiya* (ISSN 0022-9040), vol. 24, Sept. 1984, p. 62-68. In Russian. refs

A85-22524

**INCREASED PERMEABILITY OF ERYTHROCYTE MEMBRANES WITH RESPECT TO SODIUM AS A RISK FACTOR IN HYPERTENSIVE DISEASE [POVYSHENNAIA PRONITSAEMOST' MEMBRANY ERITROTSITOV DLIA NATRIIA-FAKTOR RISKABOLEVANIIA GIPERTONICHESKOI BOLEZNIU]**

V. A. LIUSOV, I. IU. POSTNOV, G. G. RIAZHSKII, M. S. ANDRIEVSKAIA, and T. V. IARTSEVA (II Moskovskii Meditsinskii Institut; Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR) *Kardiologiya* (ISSN 0022-9040), vol. 24, Sept. 1984, p. 88-90. In Russian. refs

The permeability of erythrocyte membranes with respect to sodium was investigated in 70 female and 150 male factory workers aged 20-70 years. Medical data from the test subjects was compared with measurements of erythrocyte membranes permeability obtained from blood samples. The results of the comparison showed no age related changes in the permeability of erythrocyte membranes of women and men between the ages of 20 and 30, or in subjects aged over 40 years. Arterial hypertension was diagnosed in 31 percent of those studied. Individuals with an increased erythrocyte membrane permeability with respect to sodium exhibited symptoms of hypertension twice as often as individuals with normal or decreased permeability. The rate of hypertension was found to rise with age (from 46 to 68 percent) in subjects with increased permeability of erythrocyte membranes, while no such tendency was observed in subjects with normal or decreased permeability of erythrocyte membranes. I.H.

A85-22525

**THE EFFECT OF DIURETICS ON THE HUMORAL SYSTEM OF KIDNEY PROSTAGLANDINS IN PATIENTS WITH HYPERTENSION [VLIANIE DIURETIKOV NA GUMORAL'NUIU SISTEMU PROSTAGLANDINOV POCHEK U BOL'NYKH GIPERTONICHESKOI BOLEZNIU]**

A. A. NEKRASOVA and A. K. DZHUSIPOV (Akademiia Meditsinskikh Nauk SSSR, Vsesoiuznyi Kardiologicheskii Nauchnyi Tsentr, Moscow, USSR) *Kardiologiya* (ISSN 0022-9040), vol. 24, Sept. 1984, p. 98-104. In Russian. refs

A85-22551

**THE HUMAN ORGANISM IN HYPERBARIC CONDITIONS [ORGANIZM V USLOVIIAKH GIPERBARII]**

V. N. CHERNIGOVSKII, ED. and I. A. SAPOV, ED. Leningrad, Izdatel'stvo Nauka, 1984, 160 p. In Russian. No individual items are abstracted in this volume.

Experimental and theoretical studies of the physiology of scuba divers in a high-pressure submarine environment are presented. Among the topics discussed are: the effects of hyperbaria on biochemical processes in the human body; the classification of the physiological effects of high-pressure; and some methodological approaches to the study of the functional state of scuba divers. Consideration is also given to: the reaction of the human organism to the effects of hyperbaric oxygenation; the dynamics of changes in acetylcholinesterase and erythrocyte activity in the rat brain as a result of hyperbaria; the effect of hyperoxia on the respiratory mitochondria of rats; and the application of thromboelastography to the study of physiological stability under the effects of acute hypoxia and decompression gasification. Some additional topics discussed include: the comparative effectiveness of nebulon media in the treatment of oxygen poisoning; the theoretical aspects of decompression regimes; and the barohypertension syndrome associated with immersion in water at high pressure levels. I.H.

**N85-16225# Joint Publications Research Service, Arlington, Va. VITYAZ SPECIALISTS STUDY HUMAN ADAPTABILITY TO OCEAN DEPTHS**

A. ANDROSHIN *In its USSR Rept.: Earth Sci. (JPRS-UES-84-008)* p. 6-8 13 Dec. 1984 Transl. into ENGLISH from Pravda (Moscow), 27 Sep. 1984 p. 6  
Avail: NTIS HC A06

The deep water dives of Soviet aquanauts to the summit of Mount Josephine (200 m), located 400 miles west of Gibraltar are

described. The procedures from pressure chamber to decompression are briefly explained. B.G.

**N85-16431#** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF MICROWAVE RADIATION ON LOCAL BLOOD CIRCULATION AND OXYGENATION OF BRAIN TISSUE Abstract Only**

N. P. MITAGVARIYA and K. I. BICHER *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 82 27 Dec. 1984 Transl. into ENGLISH from Byul. Eksperim. Biol. i Med. (Moscow), no. 7, Jul. 1984 p 37-39  
 Avail: NTIS HC A08

The clinical use of microwaves has grown recently in importance. Microwaves have been shown to cause hyperoxia and to change brain tissue reaction to pure oxygen. Local blood circulation in the brain as well as oxygen dynamics were studied in 53 test rabbits. Arterial pressure was measured by catheter, while brain blood flow was recorded in various regions of the brain. Microwaves generated by a Raytheon magnetron were administered to determine their effect on these parameters. Immediate fall in blood flow to the brain was quickly followed by an increase. The changes were attributed to the heat effects of the microwaves. The medulla oblongata was also exposed to microwaves. Here only brief exposure caused up to 250% increases in blood flow and 130% increases in oxygen pressure. Microwaves were found to have strong effects on brain blood flow regardless of hyperthermic effects. R.S.F.

**N85-16432#** Joint Publications Research Service, Arlington, Va.  
**HIGH VOLTAGE EFFECTS MEASURED ON DUMMY MANNEQUIN**

S. SHPUNGIN *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 101 27 Dec. 1984 Transl. into ENGLISH from Sov. Kirgiziya (USSR), 14 Sep. 1984 p 3  
 Avail: NTIS HC A08

A mannequin equipped with remote control instruments was developed to determine the level of effects which electric fields of high voltage equipment produce on persons nearby such equipment. Instruments register weak currents which occur. Pickups, an amplifier, a switch, and other devices are concealed within the mannequin. An operator commands them from a remote control unit. Information is analyzed by a microcomputer, which calculates the intensity of the electric field on various sections of the mannequin's surface. Such information is needed for medical-biological research. The testing of antistatic suits is one possible application of this innovation along with improving industrial safety in the proximity of high voltage electric fields. R.S.F.

**N85-16433#** Joint Publications Research Service, Arlington, Va.  
**NATURAL ELECTRICAL ACTIVITY OF HUMAN SYMPATHETIC NERVE FIBERS, RECORDED FROM BODY SURFACE Abstract Only**

V. V. GERZANICH, Y. S. LUSAYCHUK, I. N. REMIZOV, and V. I. SKOK *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 103-104 27 Dec. 1984 Transl. into ENGLISH from Fiz. Zh. Imeni I. M. Sechenova (Leningrad), v. 70, no. 5, May 1984 p 589-593  
 Avail: NTIS HC A08

Sympathic nerve fiber activity from the surface of the skin was recorded without using transcutaneous electrodes. Coherent accumulation of signals synchronous with the cardiac rhythm was used to separate the signal from noise. The recorded electrical wave is a flow potential or other phenomenon of physical origin related to the blood circulation. During the cardiac cycle, in which the electrogram records component II, which is absent in the denervated extremity, the rheogram of the denervated extremity is no different from that of the normal extremity. The propagation rate of the rheogram component which arises in the normal and is absent in the denervated extremity corresponds in time to the development of component II of the electrogram, considering the difference in the rate of recording of the two reactions. It is shown that component II of the electrogram taken from the surface of

the forearm by coherent accumulation of the pulse rhythm does reflect tonic sympathetic nerve activity. E.A.K.

**N85-16435#** Joint Publications Research Service, Arlington, Va.  
**CENTRAL REGULATION OF SENSORY FLOW IN HUMAN VISUAL SYSTEM Abstract Only**

A. M. IVANITSKIY, I. A. KORSKOV, and V. L. TATKO *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 107 27 Dec. 1984 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 3, May - Jun. 1984 p 339-346  
 Avail: NTIS HC A08

Bilateral stimulation through light guides were given to 21 human subjects. Evoked potentials in response to various intensities of light flashes were recorded under the control of a French computer. The subjects pressed a button in response to a given sequence of flashes. It is found that instructions given before the experiments influence the perception of the subjects and the experimental instructions were intentionally incorrect. Evoked potentials corresponded to the expected stimulus rather than the actually presented stimulus. Failure to notice changes in intensity which was correctly predicted in the instructions, resulted from spontaneous fluctuations in perceptive characteristics of the visual analyzer. E.A.K.

**N85-16436#** Joint Publications Research Service, Arlington, Va.  
**LATERAL SPECIFICS OF VISUAL PERCEPTION Abstract Only**

N. G. MANELIS and N. V. GREBENNIKOVA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 107-108 27 Dec. 1984 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 3, May - Jun. 1984 p 347-351 Original language document was announced in IAA as A84-38502  
 Avail: NTIS HC A08

The visual recognition of geometrical figures by the left and right hemispheres was investigated in 10 healthy right-handed persons 25 to 45 years of age. This tachistoscope study involved the recognition of simple figures (e.g., a square or triangle) and double figures (e.g., a square within a square). An error analysis shows that the right hemisphere was more successful than the left one in recognizing the double figures. The most common error of the left hemisphere was to perceive the double figure as a simple one. It is suggested that the left hemisphere first perceives the outer shape of the figure and then perceives the presence of an inner figure. B.J.(IAA)

**N85-16437#** Joint Publications Research Service, Arlington, Va.  
**VISUAL EVOKED POTENTIALS WITH DISRUPTED FUNCTIONING OF NONSPECIFIC CEREBRAL SYSTEMS Abstract Only**

M. L. SKLOVSKAYA and A. I. ISHMUKHAMETOV *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 108 27 Dec. 1984 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 3, May - Jun. 1984 p 352-357  
 Avail: NTIS HC A08

Visual evoked activity to examine the influence of damage to nonspecific brain stem structures was studied. Studies were performed on 32 patients with closed skull brain trauma 1 to 2 days after injury, and on 37 healthy test subjects. The EKG and evoked visual potentials were recorded. An increase in the time peak latency of all components of evoked potentials among the accident victims are observed. A significant bilateral increase in amplitude of H3 component was characteristic for most subjects. Changes were observed in the late components of the visual evoked potentials. The nature of amplitude changes in late components was mixed; the increase in H3 component was accompanied by a decrease in P4 and H4. It is suggested that the change in amplitude time characteristics of these components are electrographic reflections of disruptions of normal interrelationships in the limbic and reticular systems of the brain. E.A.K.

**N85-16438#** Joint Publications Research Service, Arlington, Va.  
**CHANGE IN RELATIONSHIP OF BIOPOTENTIALS OF BRAIN ZONES FOR VARIOUS LEVELS OF WORKING CAPACITY**  
**Abstract Only**

Y. A. PETROV *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 109-110 27 Dec. 1984 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 3, May - Jun. 1984 p 370-374  
 Avail: NTIS HC A08

The specifics of space-time relationships of cerebral biopotentials in the process of physical activity were studied. Highly qualified sportsmen with various sports specialties were tested. Changes in cortical activity were studied by correlation and coherent analysis of EEG. Restructuring of the spectral composition of the EEG and coherence of cortical potentials in the subjects at various times during the experiments are shown. Increases in intercentral correlations and coherence were observed are shown. At the initial moments of development of fatigue, the number of high correlation coefficients of potentials was 1.8 times higher than in the acute stage. In noncyclists, there were higher level of intercentral correlation and greater growth in distances of maximum coherence of EEG, particularly between precentral and prefrontal areas than in cyclists who were more accustomed to the type of exercise.

E.A.K.

**N85-16439#** Joint Publications Research Service, Arlington, Va.  
**PULMONARY BLOOD FLOW AND OXYGENATION OF ARTERIAL BLOOD IN A HEALTHY SUBJECT UPON 7 DAYS HYPOKINESIA**  
**Abstract Only**

E. M. NIKOLAYENKO, V. Y. KATKOV, S. V. GVOZDEV, V. V. CHESTUKHIN, and M. I. VOLKOVA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 110 27 Dec. 1984 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 3, May - Jun. 1984 p 421-425  
 Avail: NTIS HC A08

The dynamics of change of oxygenation of arterial blood, as well as general and regional perfusion of the lungs during 7 days antihypostatic hypokinesia were studied. Thirty to 40 minutes after a healthy subject moved from a horizontal position to the antihypostatic position, oxygenation of the arterial blood drops continuing, up to the third day. This drop in P sub O2 results from an increase in the alveolo-arterial PO2 gradient. The summary pulmonary blood flow at minus 15 deg remains unchanged, but is redistributed. Blood flow increases in the zones in the lungs which receive air from the dead space. It is decreased in zones which receive fresh gas, and decreases ventilation effectiveness which causes an increase in alveolar ventilation. Arterial hypoxemia results from displacement of the log-normal distribution of the ventilation-perfusion relationships both in the direction of lower and in the direction of higher values, which cannot be explained as being caused by the gravitational factor alone.

E.A.K.

**N85-16440#** Joint Publications Research Service, Arlington, Va.  
**SPECIFICS OF DYNAMICS OF BRAIN BIOPOTENTIALS UNDER THE INFLUENCE OF COMPLEX AUDIBLE COMMUNICATIVE SIGNALS**

L. P. NOVITSKAYA *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 111 27 Dec. 1984 Transl. into ENGLISH from Fiziol. Cheloveka (Moscow), v. 10, no. 3, May-Jun. 1984 p 469-471  
 Avail: NTIS HC A08

The specifics in the dynamics of the functional status of the brain under the influence of complex communicative audio signals based on spatial relationships of summary EEG energy and data on local and diffuse changes in its interhemispheric distribution were studied. Studies involved monopolar recording of EEG within an 8 channel electroencephalograph. The correlation coefficient was calculated by the Breinstein equation to estimate spatial relationships of bioelectric activity. Local and diffuse changes in spatial distribution of the integral summary EEG energy were estimated by calculating the percent relationship of absolute values of these indicators during the second 30 seconds of each minute. Classical music increased the probability of appearance of

significant positive correlation coefficients between the temporal areas of the two hemispheres and between the central and temporal areas of the right hemisphere. Rock and disco music decreased the probability of significant positive correlation coefficients. Data indicate different nature of the space-time changes in bioelectric activity of the brain as a function of the type of signal received.

E.A.K.

**N85-16441#** Joint Publications Research Service, Arlington, Va.  
**BIOCHEMICAL EVALUATION OF BODILY INFLUENCE OF HIGH AND LOW TEMPERATURES**  
**Abstract Only**

A. I. BARKALAYA and M. A. VERKHOTIN *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 111-112 27 Dec. 1984 Transl. into ENGLISH from Gigiyena Tr. i Prof. Zabolevaniya (Moscow), no. 3, Mar. 1984 p 31-34  
 Avail: NTIS HC A08

Physical work was performed at a moderate rate in a climate chamber at 30 to 100 deg C, relative humidity 75%. At temperatures over 50 deg C, a suit with a water tube cooling system was used. Six low temperature observations were performed in water at 4 to 5 deg C, with some of the volunteers in a heated wet suit. Blood, lactate dehydrogenase activity was studied. It was noted that high temperatures increase activity and cause skeletal muscle and myocardial hypoxia. Cooling raised the LDH activity only slightly. It is found that it is possible to record indirectly the reaction of dissociation of oxidative phosphorylation and consequently the degree of adaptive muscle thermogenesis.

E.A.K.

**N85-16442** Department of the Air Force, Washington, D.C.  
**METALLIC AID AND TECHNIQUE IN FITTING VOICE PROSTHESIS**  
**Patent**

E. CANTU, inventor (to Air Force) 14 Aug. 1984 4 p Supersedes AD-D009700  
 (AD-D011356; US-PATENT-4,465,068; US-PATENT-APPL-SN-394945; US-PATENT-CLASS-128-303)  
 Avail: US Patent and Trademark Office CSCL 06L

A metallic insert for use in radiographically fitting a voice prosthesis to a post-laryngectomy patient is described which comprises an elongate, generally cylindrically shaped cast metal member sized to fit snugly within the housing of a dummy prosthesis whereby the fit of the prosthesis can be accurately assessed radiographically in minimum time and with optimal fit to the individual patient.

GRA

**N85-16443#** Naval Medical Research Inst., Bethesda, Md.  
**PATHOGENESIS AND TREATMENT OF CEREBRAL AIR EMBOLISM AND ASSOCIATED DISORDERS**  
**Final Report**  
 P. W. CATRON, J. M. HALLENBECK, E. T. FLYNN, M. E. BRADLEY, and D. E. EVANS Apr. 1984 63 p  
 (AD-A146723; NMRI-84-20) Avail: NTIS HC A04/MF A01 CSCL 06E

A comprehensive discussion of the pathogenesis and treatment of cerebral air embolism and associated disorders is presented. Included are recommendations for diagnostic and therapeutic equipment and drugs to be available both inside and outside of the recompression chamber, and detailed rationales and schemata for administering therapy.

GRA

**N85-16444#** Letterman Army Inst. of Research, San Francisco, Calif.

**FATAL HEMORRHAGIC SHOCK AND ACETATE SOLUTIONS**  
**Final Report, Jan. - Apr. 1984**  
 L. W. TRAVERSO, W. P. LEE, M. J. LANGFORD, and L. D. WITCHER Aug. 1984 32 p  
 (AD-A146754; LAIR-181) Avail: NTIS HC A03/MF A01 CSCL 06E

One-half of deaths among trauma victims occur within 1 hour of injury and are due to rapid hemorrhage or CNS trauma. We developed a rapid hemorrhage model in unanesthetized swine to simulate human exsanguination. We compared the ability of four crystalloid solutions to prevent death after an otherwise fatal hemorrhage; normal saline (NS), Ringer's lactate (RL), Plasmalyte-A (PA), and Plasmalyte-R (PR). Five days before hemorrhage swine

received an aortic sideport and a central venous treatment catheter. Aortic blood (54ml/kg) was removed in 15 minutes from 116 swine. The percentage of shed blood replaced was 14 percent in 5 minutes with NS, 100 percent in 20 minutes with NS, and 300 percent in 30 minutes with NS, RL, PA, or PR. We found that all mortalities were determined within two hours after hemorrhage and that RL provided the best survival rate of 67 percent (NS 300%=50%, PR=40%, and PA=30%). After an analysis of arterial blood gas, lactate, acid-base, heart rate, and aortic pressure measurements, we conclude that RL is the superior crystalloid solution because of its decreased chloride load (as compared to NS) and because of the absence of acetate or magnesium (as compared to PA and PR). GRA

**N85-16445#** Naval Medical Research Inst., Bethesda, Md.  
**INDUCTION OF IMMUNITY TO TOXINS WITH ANTI-IDIOTYPIC ANTIBODY Annual Report, 1 Feb. 1983 - 30 Sep. 1984**

D. G. SIECKMANN 1 Oct. 1984 22 p

(Contract N00014-83-AF-00001)

(AD-A146793; AR-1) Avail: NTIS HC A02/MF A01 CSCL 06E

Anti-idiotypic antibodies (antibodies directed at the combining site of an antibody molecule) are being tested in a new method for safe and efficient vaccination to substances which are too toxic for direct inoculation. Exotoxin A, an extracellular toxin produced by *Pseudomonas aeruginosa* is being used as the model toxic substance. A panel of monoclonal mouse antibodies to exotoxin A were prepared in NMRI and balb/c mice, consisting of one IgG1, one IgA and six IgM hybridoma cell lines. Control monoclonals were developed from an existing panel of anti-rickettsia monoclonals of NMRI allotype. The monoclonals were purified by preparative centrifugation and column chromatography and were used to prepare anti-idiotypic antisera in mice and rabbits. High-titered anti-idiotypic antisera to one IgM anti-exotoxin monoclonal, TC-31, was raised in C57B1/6 mice. The antiserum was specific for TC-31 and noncross-reactive with the other monoclonals. High-titered anti-idiotypic antisera to each monoclonal have been prepared in rabbits. GRA

**N85-16446#** Naval Research Lab., Washington, D. C.  
**LIPOsome-ENCAPSULATED HEMOGLOBIN FOR EMERGENCY RESUSCITATION Annual Report, 1 Oct. 1983 - 30 Sep. 1984**

M. C. FARMER and B. P. GABER 1 Oct. 1984 12 p

(Contract RR0-4108)

(AD-A146794) Avail: NTIS HC A02/MF A01 CSCL 06A

An oxygen-carrying resuscitation fluid has been developed based upon liposome-encapsulated hemoglobin (LEH). The hemoglobin so encapsulated carries oxygen with unimpaired efficacy. The LEH is stable in the presence of serum and red cells in vitro and displays rheological properties similar to red cells. When tested ex vivo, encapsulation provides some protection from the vasoconstrictive effects seen with stroma-free hemoglobin. In in vivo measurements the circulation persistence of LEH in mice exceeds a half lifetime of 6 hours, with animal survival extending beyond two months. An improved lipid formulation substitutes hydrogenated soy lecithin for dimyristoyl lecithin, providing a significant cost reduction and replaces dicetylphosphate with a negatively charged lecithin, to eliminate possible toxic effects. Preliminary data suggest that a major production scale-up can be achieved using commercially available equipment. GRA

**N85-16447#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**CAROTID BARORECEPTOR INFLUENCES ON PERIPHERAL CIRCULATORY AND THERMAL RESPONSES DURING COLD EXPOSURE**

C. A. OHATA, G. D. POWERS, and P. H. SCAGLIONE 1984 34 p

(Contract DA PROJ. 3E1-62777-A-879)

(AD-A146808; USARIEM-M-1/85) Avail: NTIS HC A03/MF A01 CSCL 06S

The effects of varying the pressure within a vascularly isolated carotid sinus on peripheral circulatory and thermal responses during hindlimb exposure to room air and cold were determined in

anesthetized cats. A sigmoidal relationship between heart rate and carotid pressure was observed only during exposure to room air, suggesting that cold-induced somatosympathetic reflexes may override the carotid baroreflex effects on heart rate. At low carotid pressures, mean arterial pressure increased, femoral arterial vascular resistance decreased, femoral arterial blood flow increased, footpad thermal insulation decreased, footpad temperature increased, and footpad heat loss increased. Opposite responses were observed at high carotid pressures. These trends were observed during hindlimb exposure to both room air and cold. The persistence of baroreceptor effects on peripheral circulatory and thermal responses in a locally cold-exposed hindlimb provides evidence that cold-induced vasodilatory responses may be mediated by baroreceptor reflexes. GRA

**N85-16448#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**COMPARISON OF THERMAL RESPONSES BETWEEN REST AND LEG EXERCISE IN WATER**

M. M. TONER, M. N. SAWKA, W. L. HOLDEN, and K. B. PANDOLF 9 Oct. 1984 25 p

(Contract DA PROJ. 3E1-62777-A-879)

(AD-A146818; USARIEM-M2/85) Avail: NTIS HC A02/MF A01 CSCL 06S

This study examined both the thermal and metabolic responses of individuals in cool (30 C, n=9) and cold (18 C, n=7; 20 C, n=2) water. Male volunteers were immersed up the neck for 1 h during both seated rest (R) and leg exercise (LE). In 30 C water, metabolic rate (M) remained unchanged over time during both R (115 W, 60 min) and LE (528 W, 60 min). Mean skin temperature (Tsk) declined ( $P<0.05$ ) over 1 h during R, while Tsk was unchanged during LE. Data indicated that LE is more effective than R in maintaining core temperatures in both cool and cold water. Also, immersion in cold water elicits differing core temperatures indicating that chest cavity temperature is maintained at a higher level than other core areas. GRA

**N85-16449#** Southwest Research Inst., San Antonio, Tex. Engineering Sciences Div.

**A CREW EXPOSURE STUDY. VOLUME 1: OFFSHORE Final Report, on Phase 2**

W. J. ASTLEFORD, L. S. BAY, T. B. MORROW, R. H. PISH, and J. P. RIEGEL Jun. 1984 205 p 2 Vol.

(Contract DTCG23-80-C-20015)

(AD-A146884; REPT-06-6177-VOL-1; USCG-D-21-84) Avail: NTIS HC A10/MF A01 CSCL 06J

The objective of this project was to implement the Phase 1 test plan for characterizing occupational exposures of offshore facility workers to chemical substances and selected physical agents. This report documents the measurement and monitoring data that were collected during a 7-day period on drilling and production facilities. Respirable and total dust/fume exposures were monitored during mud makeup operations, welding and rust/paint chipping. Sound pressure level contour maps were generated for seven platforms and two rigs. Personal noise dosimetry data were collected during drilling and tripping, addition of drilling fluid chemicals and maintenance/repair activities. Occupational exposures to dusts and fumes were evaluated relative to ACGIH exposure limits. Noise dosimetry data were interpreted relative to the exposure guidelines in USCG Navigation and Vessel Inspection Circular (NVC 12-82). The study concluded that exposures to the airborne substances were acceptable for the materials and operations that existed during the 7-day observation. Additional monitoring would be needed to assess other drilling muds and mud chemicals that were not observed. Noise data obtained on this study indicate the need for initiating or maintaining hearing conservation programs. Author (GRA)



**N85-16450#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**EFFECTS OF RESTRICTED WATER INTAKE ON PERFORMANCE IN A COLD ENVIRONMENT**

D. E. ROBERTS, J. F. PATTON, J. W. PENNYCOOK, M. J. JACEY, and D. V. TAPPAN 1 May 1984 29 p  
(AD-A146904; USARIEM-T-2/84) Avail: NTIS HC A03/MF A01 CSDL 06S

Eighteen male subjects were housed for 10 days in an environmental chamber maintained at 70 F for the first 3 days and then lowered to -10 F for the next 5 days and maintained at 70 F for the last 2 days. Subjects received a standard ration containing 4500 kcal and either 1.5L (Group 1) or 3.0L (Group 2) of water per day beginning on the first cold day. All subjects were slightly dehydrated (2% BW) prior to cold exposure. After exposure, the weight loss for Group 1 was  $3.49 \pm 0.35\%$  BW ( $p < .05$ ) while Group 2 regained most of their initial loss and was down only  $.14 \pm 0.35\%$  BW. There was no significant difference in the groups' ability to perform endurance tests, but Group 1 showed a significant degree of hand cooling ( $p < .01$ ). These data indicate that exercise can be performed satisfactorily even when subjects are not well hydrated, but their response to environmental conditions is adversely affected. The data further indicate that a person can function and remain hydrated on 3.0L water/day under severe conditions. GRA

**N85-16451#** Naval Biodynamics Lab., New Orleans, La.  
**NICHOLET MED-80 (TRADEMARK) PROGRAMS IN THE NAVAL BIODYNAMICS LABORATORY EVOKED POTENTIAL SERIES**

R. E. TABLER, JR. Jul. 1984 78 p  
(AD-A147105; NBDL-84R007) Avail: NTIS HC A05/MF A01 CSDL 06S

This report gives complete documentation and listings for five computer programs developed at the Naval Biodynamics Laboratory to record, analyze, and plot evoked potential data using the Nicolette Med-80 computer. The programs are: EPPROG, PERDAT, EPDATA, PLOTPE, and LSTPER. Appendices include: wiring for the Med-80, flowcharts for all programs, and printouts of all programs. GRA

**N85-16452#** Naval Ocean Systems Center, San Diego, Calif.  
**MILITARY VITAL SIGN MONITOR Final Technical Report, 15 Feb. - 30 Jul. 1984**

R. W. KATAOKA and F. R. BORKAT 30 Sep. 1984 39 p  
(Contract M09-93)  
(AD-A147257; NOSC/TR-992) Avail: NTIS HC A03/MF A01 CSDL 06L

The investigation of commercial vital monitoring devices for use aboard Navy/Marine Corps helicopters is summarized. Army and Air Force activity in test area, as well as NATO requirements, are presented. Finally, generalized military testing procedures are identified for medical equipment used aboard aircraft. GRA

**N85-16453#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**TESTING CHANGES IN VISUAL FUNCTION DUE TO ORBITAL ENVIRONMENT Final Report**

L. V. GENCO and H. L. TASK Jan. 1984 42 p  
(Contract AF PROJ. 6893; AF PROJ. 7184)  
(AD-A147259; AFAMRL-TR-84-049) Avail: NTIS HC A03/MF A01 CSDL 06P

The effects of weightlessness and other space environmental conditions on vision have received little attention since the visual acuity experiments performance by Dr. Duntley, circa 1968. Although several subsequent investigators have attempted to construct vision testers suitable for use in space, none was fully successful until the production of the device described in this report. The report describes a device submitted by the AF Aerospace Medical Research Laboratory for inclusion aboard several NASA Shuttle Flights, in an attempt to detect and quantify certain changes in visual performance caused by the environmental conditions experienced while in Earth orbit. GRA

**N85-16454#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

**NEURO-LINGUISTIC PROGRAMMING: EYE MOVEMENTS AS INDICATORS OF REPRESENTATIONAL SYSTEMS M.S. Thesis**

W. H. MOORE and G. A. POWELL Sep. 1984 79 p  
(AD-A147541; AFIT/GLM/LSM/84S-48) Avail: NTIS HC A05/MF A01 CSDL 05J

The experiment documented in this thesis investigated the eye movement hypothesis of the Neuro-Linguistic Programming model by testing the initial and dominant eye movements of forty-three male, right handed subjects against two methods of determining representational systems: the categorization of verbal responses and the selection of written descriptors, both in response to stimulus cues. Chi squared contingency tables were used to test dependency. Neuro-Linguistic Programming was developed by Richard Bandler and John Grinder. It is a model of human communications and behavior which claims that people organize and access information using representational systems. These systems are based on sensory modes, primarily auditory, visual, and kinesthetic. According to the model, specific eye movements are associated with, and are indicators of these representational systems. In this study, verbal responses were found to be dependent upon dominant eye movement statistically significant to the .10 level ( $X^2 = 8.5385$ , 4d.f.). No correlation was found between dominant eye movement and the selection of written descriptors or between initial eye movements and either verbal response or descriptor selection. GRA

**N85-16455#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**EFFECTS OF BODY MASS AND MORPHOLOGY ON THERMAL RESPONSES IN WATER**

M. M. TONER, M. N. SAWKA, M. E. FOLEY, and K. B. PANDOLF 30 Oct. 1984 24 p  
(AD-A147558; USARIEM-M6/85) Avail: NTIS HC A02/MF A01 CSDL 06P

Ten male volunteers were divided into two groups based on body size and weight. The large body mass (LM) group ( $n=5$ ) was 16.3 Kg heavier and 24 sq. m/kg. smaller in surface area-to-weight ratio ( $P < 0.05$ ) than the small body mass group ( $n=5$ ). Both groups were similar in total body fat and skinfold thicknesses ( $P > 0.05$ ). All individuals were immersed for 1 h in water at 26 deg C during both rest and one intensity of exercise. During resting exposures, metabolic rate, mean-heat flow, and rectal temperature were not different ( $P > 0.05$ ) between the LM and SM groups at min 60. Esophageal temperature was higher ( $P < 0.05$ ) for the SM groups at min 60, though the change in Esophageal temp during the 60 min between groups was similar (LM, -0.4 deg C; SM, -0.2 deg C). Similarly during exercise the above data were not different ( $P > 0.05$ ) between groups at min 60. These data illustrates that moderate differences in body size and weight between individuals from a given population do not effect thermal responses in water. Also, studies contrasting dissimilar populations such as men and women should consider alternative explanations for differing thermal responses when body size differences are of similar magnitude as presently reported. GRA

**N85-16456#** Chrysler Corp., Huntsville, Ala. Military-Public Electronic Systems.

**IMPROVED RADIOGRAPHIC VIEWING SYSTEM Final Summary Report, 15 Jan. 1983 - 15 Apr. 1984**

E. W. GEORGE and L. M. PERRY 6 Apr. 1984 75 p  
(Contract DAMD17-83-C-3006; DA PROJ. 3S4-64717-D-832)  
(AD-A147587) Avail: NTIS HC A04/MF A01 CSDL 06L

An improved radiographic viewing system was developed for field medical X-ray applications. This effort began with research on state-of-the-art technology in X-ray to light conversion screens (especially fiber optic scintillators), image intensifiers, and detectors. The findings of this research were used to design a radiographic camera which was then constructed and tested. It is lightweight, compact, rugged, with good resolution and sensitivity. GRA



**N85-16457#** Oregon State Univ., Corvallis. Environmental Health Science Center.

**CHEMICAL PROTECTION AGAINST IONIZING RADIATION Final Report**

J. C. LIVESEY, D. J. REED, and L. F. ADAMSON Aug. 1984 161 p

(Contract EMW-E-0883)

(AD-A147822; UCRL-15644) Avail: NTIS HC A08/MF A01 CSCL 06R

The scientific literature on radiation-protective drugs is reviewed. Emphasis is placed on the mechanisms involved in determining the sensitivity of biological material to ionizing radiation and mechanisms of chemical radioprotection. In Section 1, the types of radiation are described and the effects of ionizing radiation on biological systems are reviewed. The effects of ionizing radiation are briefly contrasted with the effects of non-ionizing radiation. Section 2 reviews the contributions of various natural factors which influence the inherent radiosensitivity of biological systems. Included in the list of these factors are water, oxygen, thiols, vitamins and antioxidants. Brief attention is given to the model describing competition between oxygen and natural radioprotective substances (principally, thiols) in determining the net cellular radiosensitivity. Several theories of the mechanism(s) of action of radioprotective drugs are described in Section 3. These mechanisms include the production of hypoxia, detoxication of radiochemical reactive species, stabilization of the radiobiological target and the enhancement of damage repair processes. Section 4 describes the current strategies for the treatment of radiation injury. Likely areas in which fruitful research might be performed are described in Section 5. GRA

**N85-16458#** Massachusetts Inst. of Tech., Cambridge. Artificial Intelligence Lab.

**VISION BY MAN AND MACHINE: HOW THE BRAIN PROCESSES VISUAL INFORMATION MAY BE SUGGESTED BY STUDIES IN COMPUTER VISION (AND VICE VERSA)**

T. POGGIO Mar. 1984 14 p

(Contract N00014-80-C-0505)

(AD-A147890; AI-M-776) Avail: NTIS HC A02/MF A01 CSCL 06P

The development of increasingly sophisticated and powerful computers in the last few decades has frequently stimulated comparisons between them and the human brain. Such comparisons will become more earnest as computers are applied more and more to tasks formerly associated with essentially human activities and capabilities. The expectation of a coming generation of intelligent computers and robots with sensory, motor and even intellectual skills comparable in quality to our own is becoming more widespread and is leading to a new and potentially productive analytical science of information processing. In no field has this new approach been so precisely formulated and so thoroughly exemplified as in the field of vision. As the dominant sensory modality of man, vision is one of the major keys to our mastery of the environment and to our understanding and control of the objects which surround us. If we wish to create robots capable of performing complex manipulative tasks in a changing environment, we must surely endow them with (among other things) adequate visual powers. How can we set about designing such flexible and adaptive robots? In designing them, can we make use of our rapidly growing knowledge of the human brain, and if so, how at the same time, can our experience in designing artificial vision systems help us to understand how the brain analyzes visual information? GRA

**N85-16459#** Department of the Air Force, Washington, D.C. **RANDOM PATTERN TRACKING ACCELERATION TOLERANCE TESTER Patent Application**

D. W. REPPERGER, inventor (to Air Force) 29 Aug. 1984 43 p

(AD-D011404; US-PATENT-APPL-SN-645390) Avail: NTIS HC A03/MF A01 CSCL 06S

A G force acceleration effects monitoring apparatus involving a pair of LED or other visual stimulus arrays, one randomly

patterned by an electronic driving apparatus and one patterned by the manipulation of a G force test subject. The electronic driving apparatus preferably includes a sum of sines algorithm and the test subject manipulation are received preferably from a joystick controller. Mounting of the apparatus in a centrifuge gondola and also in off-line training stations and use of the invention by animals are also disclosed. This invention relates to the field of G force acceleration effect sensing accomplished by way of visual field and psychomotor tracking performance evaluation in a test subject. When a human subject is exposed to increasing G force acceleration, a well-established sequence of degradation changes in the subject's blood circulation occur. GRA

**N85-16460#** Technical Research Centre of Finland, Espoo. Ydinvoimatekniikan Lab.

**ASSESSMENT OF RADIATION DOSAGES OBTAINED BY INTAKE OF RADIOACTIVE FALLOUT CONTAMINATED FOOD [RADIOAKTIIVISESTA LASKEUMASTA RAVINNON KAUTTA AIHEUTUVIEN SAATELYANNOSTEN ARVIOINTI]**

R. KAKKO and J. PARTANEN Aug. 1984 62 p refs In FINNISH

(VTT-292; ISBN-951-38-2109-9; ISSN-0358-5077) Avail: NTIS HC A04/MF A01

The sub-program Agricultural Doses (Agrid) was constructed as part of the Assessment of Risks of Accidents and Normal Operation (Arano)-program. It is based on the Foodchain Transfer Module in the Methodology for Assessing the Radiological Consequences of Accidental Releases (Food-Marc)-program, but it is simplified and enlarged taking into account the seasonal variations in Finland and five different agricultural products: vegetables, grain, beets, milk, and meat. Using Agrid, the effective doses obtained by each of the human intestines and the thyroid gland dose obtained by milk intake may be assessed. Author (ESA)

**N85-16461#** National Inst. of Health, Bethesda, Md. Natl. Inst. of Arthritis, Diabetes, and Digestive and Kidney Diseases.

**EVALUATION OF THE MUSCULOSKELETAL DISEASES PROGRAM Final Report**

S. L. GORDON Mar. 1984 218 p

(PB84-230648; NIADDK-80/301; NIH/PUB-84-109) Avail: NTIS HC A10/MF A01 CSCL 06E

The evaluation was conducted in order to assess the effectiveness of the goals, performance and managerial approaches of a Musculoskeletal Diseases Program so as to help provide a foundation for improving research efforts. An assessment of the health care impact of selected medical technologies that were developed with program resources is given. The contractor convened evaluation groups (a Steering Committee and four Task Groups) having broad public and private membership in order to utilize their diverse expertise to determine evaluation strategy, select appropriate methodologies, establish a uniform format for all reports, define evaluation goals and procedures, and generate the final report. The resultant information is intended to provide a basis for those concerned with musculoskeletal diseases to help improve research and operational effectiveness. GRA

**N85-16462#** Professional Staff Association of the Rancho Los Amigos Hospital, Inc., Downey, Calif.

**SHORT-TERM HUMAN RESPIRATORY EFFECTS OF NITROGEN DIOXIDE: DETERMINATION OF QUANTITATIVE DOSE-RESPONSE PROFILES. PHASE 2: EXPOSURE OF ASTHMATIC VOLUNTEERS TO 4 PPM NO2 Final Report**

W. S. LINN and J. D. HACKNEY 18 May 1984 65 p refs Sponsored by Coordinating Research Council, Inc.

(PB85-104388/GAR; CRC-CAPM-48-83-02) Avail: NTIS HC A04/MF A01 CSCL 06T

Twenty-three asthmatic volunteers were exposed twice each to purified air (control) and to 4 ppm NO2 (exposure) for periods of one hour, fifteen minutes, including light and heavy bicycle exercise (fifteen minutes each). No statistically significant differences between control and exposure were found for airway resistance, symptoms, heart rate, skin conductance, or self-reported

emotional state. Increased airway resistance was observable after exercise, whether in clean air or NO<sub>2</sub>. Systolic blood pressure showed small but statistically significant differences between control and exposure: it tended to be lower in NO<sub>2</sub> than in clean air during the later part of the exposure period. In asthmatic as well as in normal subjects, earlier reports that NO<sub>2</sub> exposure produces short-term airway constriction were unable to be confirmed. Author (GRA)

**N85-16463#** Saint Luke's Hospital, Milwaukee, Wis. Dept. of Hyperbaric Medicine.

**SAFE DECOMPRESSION SCHEDULES FOR CAISSON WORKERS Final Report**

E. P. KINDWALL, P. O. EDEL (Sea-Space Research Co., Marrero, La.), and H. E. MELTON (Diasonics, Inc., Milpitas, Calif.) 1 Dec. 1983 126 p refs

(Contract PHS-OH-00947)

(PB85-103612/GAR) Avail: NTIS HC A07/MF A01 CSDL 06S

A 3 year program designed to evaluate new decompression tables for compressed air workers is described. Development of tables from commercial diving data is reviewed, along with the general considerations and procedures used to compare these and Office of Safety and Health Administration (OSHA) tables using human subjects. Specific methods are described for whole body nitrogen washout studies and ultrasonic bubble detection experiments. The authors concluded that little difference exists between the decompression schedules given by these decompression tables and OSHA tables; however, the decompression tables are significantly better than the OSHA tables since they combine the use of oxygen and stage decompression which have synergistic effects in increasing nitrogen elimination during decompression. The schedules may be difficult to implement because of added equipment costs and the need to retain caisson crews. GRA

**N85-17516#** Joint Publications Research Service, Arlington, Va. **INFLUENCE OF GEOMAGNETIC DISTURBANCES ON CARDIOVASCULAR FUNCTION OF ATHLETES Abstract Only**

G. V. RYZHIKOV and T. D. DZHEBRAILOVA *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 19 7 Jan. 1985 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 640-646

Avail: NTIS HC A03/MF A01

Eleven men 20 to 30 years of age from a rifle firing team took part in the study. EKG and arterial pressure studies were performed before and after training and competition. The variation coefficient of R-R interval, index of intensity, and autonomic index were recorded. The results produced were compared with studies of the degree of disturbance, presence of magnetic storms, and their force and values of K intensity index for the time period. On days of magnetic disturbance there was a decrease in sports results. In terms of the degree of this decrease, the athletes can be divided into those resistant to magnetic disturbances, relatively resistant, and nonresistant. The increase in sympathetic influences on cardiac activity during geomagnetic disturbances was observed in those cases when the autonomic index was initially close to zero, particularly when magnetic storms began suddenly. Athletes with strong sympathetic influence on cardiac activity were more resistant to the effects of geomagnetic storms. Author

**N85-17517#** Joint Publications Research Service, Arlington, Va. **FUNCTIONAL INTER-HEMISPHERE ASYMMETRY IN RECOGNITION OF VISUAL STIMULI OF VARIOUS CLASSES Abstract Only**

G. P. UDALOVA and I. A. KASHINA *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 19-20 7 Jan. 1985 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 578-588

Avail: NTIS HC A03/MF A01

The variation in degree of brain hemisphere dominance was determined as a function of the class of visual stimuli and time parameters of their presentation, nature of the visual task, specifics of motor reaction, and sex of the test subjects. A set of achromatic

slides with 5 classes of stimuli were utilized. Fifty healthy test subjects of both sexes participated. Processing of the experimental material indicated the presence, upon visual recognition, of a certain variation of the direction and degree of manifestation of inter-hemisphere asymmetry as a function of the level of verbal processing of the images presented, the degree of utilization of abstract and concrete characteristics of the stimulus, its emotional coloration, time parameters of stimulation, specifics of implementation of motor reaction, and sex of the test subjects. These factors should be considered when visual stimuli are used in clinical practice as tests for topic diagnosis of brain image. R.S.F.

**N85-17518#** Joint Publications Research Service, Arlington, Va. **ENCEPHALOGRAPHIC CORRELATES OF AUTOGENOUS CHANGE IN HUMAN FUNCTIONAL STATE**

A. A. ANTONOV *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 20 7 Jan. 1985 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 594-596 t/s Abstract Only

Avail: NTIS HC A03/MF A01

The influence of respiratory exercise used to optimize physical condition before sports contests on the functioning of the central nervous system was studied. Twelve healthy men 28 to 35 years of age were studied in a light-and-sound-insulated chamber in the morning hours. Each subject was studied 4 times at intervals of 6 to 12 days. The MMPI test was used to evaluate the emotional-mental state before each session. EEG's were recorded bipolarly in two leads from the left hemisphere with a time constant of 0.1 over 400 seconds in each stage of the study. The breathing exercises caused a change in the level of spatial synchronization of bioelectric activity of the frontal-temporal and temporal-occipital segments of the cerebral cortex. Depending on the initial emotional-mental state of the subjects, breathing exercises caused an increase in reduced or a decrease in elevated levels of spatial synchronization of bioelectric activity in these areas of the cortex. Author

**N85-17519#** Joint Publications Research Service, Arlington, Va. **DYNAMICS OF EXTERNAL RESPIRATION AND GAS METABOLISM UNDER COMBINED EFFECT OF HYPOXIA AND HYPERCAPNIA Abstract Only**

N. A. AGADZHANYAN, L. K. BRAGIN, G. A. DAVYDOV, and Y. A. SPASSKIY *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 21 7 Jan. 1985 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Jul. - Aug. 1984 p 610-616

Avail: NTIS HC A03/MF A01

Two series of experiments were performed involving 20 healthy men 20 to 30 years of age. One series of studies was performed in the plains, another in the mountains. In studies of series IA after breathing air the subjects were shifted each 15 minutes to breathing of normoxic gas mixtures with partial carbon dioxide pressure 19, 38, and 57 mm Hg. In series IB-D the partial pressure of oxygen was decreased in stages to 130, 100, and 70 mm Hg. In series IIA and B, the oxygen partial pressure corresponded to the oxygen content in the surrounding mountain air, 105 to 110 mm Hg, while the carbon dioxide partial pressure was increased to 19 and 38 mm Hg. All studies were performed at rest in a seated position, except IIB, in which the test subjects performed light work on a bicycle ergometer. The experiments show that a change in the number of physiological indices upon development of hypercapnia during various stages of mountain adaptation at rest are retained under moderate physical loading. Author

**N85-17520#** Joint Publications Research Service, Arlington, Va.  
**FACTORS DETERMINING EFFECTIVENESS OF VOLUNTARY DECREASE IN VENTILATION DURING MUSCULAR WORK USING INSTRUMENTED FEEDBACK Abstract Only**

S. N. KUCHKIN *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 21-22 7 Jan. 1985 Transl. into ENGLISH from *Fiz. Cheloveka (Moscow)*, v. 10, no. 4, Jul. - Aug. 1984 p 623-630 Original language document was announced in IAA as A84-46537  
 Avail: NTIS HC A03/MF A01

Experiments were conducted on eight subjects, 17-18 years of age. It is shown that a voluntary reduction of the level of ventilation under increasing muscular loads can be achieved through instrumented feedback in the range of 60-80 percent of the reference level and is limited by the imperative breathing stimulus (due mainly to progressive hypercapnia). The efficiency of the voluntary reduction is shown to depend on three factors: (1) the type of working hypernea according to the pattern of  $P(A)CO_2$  under increasing loads; (2) the basal type of breathing pattern; and (3) the degree to which the habit of voluntary control of breathing has been learned. B.J. (IAA)

**N85-17521#** Joint Publications Research Service, Arlington, Va.  
**HYPERBARIC PHYSIOLOGY (STATUS AND PROSPECTS) Abstract Only**

G. L. ZALTSMAN *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 22 7 Jan. 1985 Transl. into ENGLISH from *Fiz. Cheloveka (Moscow)*, v. 10, no. 4, Jul. - Aug. 1984 p 659-673 Original language document was announced in IAA as A84-46540  
 Avail: NTIS HC A03/MF A01

A description is given of human physiology in a hyperbaric environment, and attention is paid to the effects of hyperbaric environments on physiological processes and structures of the human body, to the physiological foundations for the mastering of hyperbaric environments, to the effects of hyperbaric environments on pathological processes, and to therapeutic applications of hyperbaric environments. Tables enumerating extremal factors of hyperbaric environments and corresponding adaptive and pathological reactions are given. B.J. (IAA)

**N85-17523#** Joint Publications Research Service, Arlington, Va.  
**SIMULTANEOUS DETERMINATION OF RADIATION AND CONVECTION HEAT TRANSFER Abstract Only**

A. N. SINITSYN and Y. A. IVANOV *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 23-24 7 Jan. 1985 Transl. into ENGLISH from *Gigiyena i Sanit. (Moscow)*, no. 7, Jul. 1984 p 43-45  
 Avail: NTIS HC A03/MF A01

Heat transfer by radiation and convection was analyzed mathematically to design a relatively simple approach for determining human heat balance in situations where both factors are at play. Proceeding from the general physical laws of heat transfer, where convective transfer ( $q_{sub c}$ ) is proportional to the temperature difference between body surface ( $T_{sub s}$ ) and air ( $T_{sub a}$ ), and radiation transfer ( $q_{sub r}$ ) is proportional to the difference between  $T_{sub s}$  and the mean temperature of surrounding surfaces (mean radiation temperature,  $T_{sub r}$ ), the following equation can be derived ( $q_{sub rc} = (q_{sub}) + (q_{sub c}) = \alpha_{sub r} + \alpha_{sub c} (T_{sub s} - RCT)$ ). In the equation,  $q_{sub rc}$  is the rate of heat exchange by radiation and convection,  $\alpha_{sub c}$  and  $\alpha_{sub r}$  are heat transfer coefficients between a body and its surroundings via convection and radiation, respectively, and  $RCT = \text{radio-convective temperature} = (\alpha_{sub c}(T_{sub a}) + (\alpha_{sub r}(T_{sub r})/(\alpha_{sub c}) + (\alpha_{sub r}))$ . R.S.F.

**N85-17524#** Joint Publications Research Service, Arlington, Va.  
**EFFECTS OF PROLONGED HYPOKINESIA ON NERVOUS SYSTEM Abstract Only**

T. N. KRUPINA, K. K. YARULLIN, and A. Y. TIZUL *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001)* p 24 7 Jan. 1982 Transl. into ENGLISH from *Sov. Med. (Moscow)*, no. 8, Aug. 1984 p 27-31  
 Avail: NTIS HC A03/MF A01

Male volunteers were tested for the physiological consequence of extended, limited motor activity in relation to age and state of health. The experimental conditions included long periods of submersion, sensory deprivation, clinistatic and anti-orthostatic hypokinesia, etc. The systems showing the earliest signs of decompensation included the autonomic nervous system, particularly its vasomotor component, neuropsychiatric interactions, and certain metabolic processes (especially water-electrolyte balance and lipid metabolism). Other systems evidencing altered functional status were the neuroendocrine and immune systems, with the most pronounced onset on physiological imbalance becoming evident after two months of limited motor activity. These observations point to the need for a regular exercise program during space flight to maintain optimum performance during periods of restricted physical activity, and to facilitate physiological recovery once periods of inactivity are over. R.S.F.

**N85-17525\*#** National Aeronautics and Space Administration, Washington, D. C.  
**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES**

Jan. 1985 58 p  
 (NASA-SP-7011(266); NAS 1.21:7011(266)) Avail: NTIS HC \$7.00 CSCL 06E

This bibliography lists 148 reports, articles and other documents introduced into the NASA scientific and technical information system in December 1984. Author

**N85-17526\*** National Aeronautics and Space Administration, Washington, D. C.  
**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 268**

Feb. 1985 65 p  
 (NASA-SP-7011(268); NAS 1.21:7011(268)) Avail: NTIS HC A04 \$7.00 CSCL 06E

This bibliography lists 167 reports, articles and other documents introduced into the NASA scientific and technical information system in January 1985. Author

**N85-17527#** Naval Health Research Center, San Diego, Calif.  
**LABORATORY NOTE: EFFECT ON SLEEP LATENCY OF PRE-SLEEP AEP (AUDITORY EVOKED POTENTIAL) PROCEDURES Interim Report, Sep. 1982 - Jun. 1984**

C. L. SPINWEBER Jun. 1984 7 p  
 (Contract MR0-4101)  
 (AD-A147620; NAVHLTHRSCHC-84-17) Avail: NTIS HC A02/MF A01 CSCL 05J

In a 12-night study of the effects of 1-tryptophan in poor sleepers, waking auditory evoked potentials (AEPs) were obtained prior to lights out on the third placebo-baseline night and fifth treatment night. Sleep latencies were significantly shorter on both AEP nights. The components of the AEP procedure may facilitate sleep onset by promoting relaxation and lowering psychophysiological arousal level in poor sleepers. GRA

**N85-17528#** Army Research Inst. of Environmental Medicine, Natick, Mass.

**THERMOREGULATORY RESPONSES DURING EXERCISE AT GRADED HYPOHYDRATION LEVELS**

M. N. SAWKA, A. J. YOUNG, R. P. FRANCESCONI, S. R. MUZA, and K. B. PANDOLF 5 Nov. 1984 32 p  
(Contract DA PROJ. 3E1-62777-A-879)  
(AD-A147733; USARIEM-M-7/85) Avail: NTIS HC A03/MF A01 CSCL 06S

This study examined the effects of graded hypohydration levels on thermoregulatory responses during exercise in the heat. Eight heat acclimated male volunteers attempted four Heat Stress Tests (HST'S). One HST was attempted during euhydration, and three HST'S were attempted while the subjects were hypohydrated by 3%, 5% and 7% of their body weight. Hypohydration was achieved by an exercise-heat regimen on the day prior to each HST. After 30-min of rest in a 20 C antechamber, the HST consisted of a 140-min exposure (four repeats of 10-min rest and 25-min treadmill walking) in a hot-dry (49 C, 20% rh) environment. The following new observations were made: (1) a low hypohydration level primarily reduced plasma volume with little effect on plasma osmolality, whereas, a more severe hypohydration level resulted in no further plasma volume reduction but a large increment in plasma osmolality; (2) core temperature and heart rate responses were increased with severity of hypohydration; (3) sweating rate responses for a given rectal temperature were systematically decreased with severity of hypohydration; and (4) the reduction in sweating rate was more strongly associated with plasma hyperosmolality than to hypovolemia. GRA

**N85-17529#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**AVIATION-RELATED CARDIORESPIRATORY EFFECTS OF BLOOD DONATION IN FEMALE PILOTS**

M. T. LATEGOLA, A. W. DAVIS, JR., R. O. GILCHER (Oklahoma Blood Inst.), P. J. LYNE, and M. J. BURR Mar. 1984 37 p  
(AD-A148045; AD-E850735; FAA/AM-84-4) Avail: NTIS HC A03/MF A01 CSCL 06S

Ten healthy female pilots, 20-49 years old and weighing more than 110 pounds were tested for tolerances to hypoxia orthostatic stress, and physical work at 1 and 3 d after donating about 450 mL of blood on one occasion, and 6 mL (sham control) on a second separate occasion. Testing included consecutive 30-min seated exposures to each of four oxygen-nitrogen mixtures (equal to air breathing at 6,000, 8,000, 10,000 and 12,400 ft of altitude), 5 min of quiet standing, and seated pedal ergometry braded to produce a heart rate of 140 beats per min. The findings of this study indicated that, if the complete absence of adverse symptoms at ground level, a pilot may return to flying between 1 and 3 d after blood donation with the recommended initial precautions that: cabin altitude be limited to < 6,000 during flight; and +Gz stress exceeding the equivalent of short-duration level turns at 30 deg of bank angle be avoided. Until complete restoration of the pilot's in-flight physiological tolerances has occurred, the presence of a copilot and on-board availability of supplemental oxygen are also recommended. GRA

**N85-17530#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

**THE EFFECT OF BETA ADRENERGIC BLOCKADE ON RATINGS OF PERCEIVED EXERTION M.S. Thesis - Arizona Univ.**

A. A. HARTZELL 1984 120 p  
(AD-A148053; AFIT/CI/NR-84-89T) Avail: NTIS HC A06/MF A01 CSCL 06S

The purpose of this study was to describe the effect of beta blockade and endurance training on ratings of perceived exertion (RPE). Forty-seven healthy but sedentary male subjects, age 17 to 34 years, were randomly assigned to one of three groups, i.e. placebo, propranolol (160 mg/day) and atenolol (100 mg/day), and completed a 15-week endurance training program. Training responses were evidenced in all groups by increases in maximal oxygen uptake and ventilation, along with a reduction in maximal heart rate. RPE was significantly reduced post-training in both the

blocked and unblocked conditions. However, RPE for the same relative work rate was unchanged in all three groups. Thus, beta blockade does not attenuate the normal physiological response to endurance training, nor does it affect RPE when expressed in relative terms. Therefore, RPE can be used in exercise prescription to monitor relative exercise intensity. GRA

**N85-17531#** Civil Aeromedical Inst., Oklahoma City, Okla.  
**EFFORTS TO IMPROVE AVIATION MEDICAL EXAMINER PERFORMANCE THROUGH CONTINUING MEDICAL EDUCATION AND ANNUAL PERFORMANCE REPORTS**

J. R. DILLE and J. L. HARRIS Aug. 1984 10 p  
(AD-A148078; FAA-AM-84-7) Avail: NTIS HC A02/MF A01 CSCL 06E

Continuing medical education (CME) serves to maintain or increase the knowledge, interpretive proficiencies, and technical skills that a physician uses in his/her practice of medicine. Resulting improvement in professional performance is frequently difficult to measure, particularly in aerospace medicine, but CME is required for relicensure and/or or medical society membership in 70% of states. The Civil Aeromedical Institute first received American Medical Association approval for Category 1 CME credit for attendance at FAA seminars in January 1973. We began preparing 21-item annual performance reports for each aviation medical examiner (AME) in 1979 to attempt to isolate the causes of, and to reduce, computer rejection of about one-fourth of all medical certification input because of omissions or procedural errors. There was little improvement in error rate through 1982. We are presently conducting special sessions and open-book tests for new AME's, lecturing to military flight surgeons, and encouraging Regional Flight Surgeons to review reports of physical examinations from new and frequent-error AME's. GRA

**N85-17532#** Naval Health Research Center, San Diego, Calif.  
**TECHNIQUE FOR MEASURING BODY CIRCUMFERENCES AND SKINFOLD THICKNESSES Interim Report**

M. B. BECKETT and J. A. HODGDON Aug. 1984 45 p  
(AD-A148166; NAVHLTHRSCHC-84-39) Avail: NTIS HC A03/MF A01 CSCL 06E

Anthropometry is measurement of the human body. It can be used to estimate body composition, to describe body build, and in the design of equipment to match human form. This report provides complete instructions for the measurement of 12 body circumferences and 8 skinfolds. When used as a teaching device, this report will allow previously untrained personnel to perform anthropometry in an accurate and reliable manner. GRA

**N85-17533#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**HEALTH EXAMINATION FINDINGS AMONG ACTIVE CIVIL AIRMEN**

C. F. BOOZE, JR. Aug. 1984 13 p  
(AD-A148325; FAA-AM-84-8) Avail: NTIS HC A02/MF A01 CSCL 06E

It has been the policy of the Federal Aviation Administration to medically certify individuals, for a variety of flying privileges, who have a medical deficiency or disease, provided it can be determined that such action does not compromise air safety. During recent years, for example, standards have been relaxed with respect to contact lens use and medication allowed for control of hypertension. This descriptive epidemiologic study presents the point prevalence of pathology among active airmen as of January 1, 1984. Data were obtained from active computer files maintained by the Aeromedical Certification Branch of the Civil Aeromedical Institute in connection with the certification program. Cardiovascular, eye, and abdominal pathologies represent the most prevalent medical conditions among active airmen (5.9%, 4.4%, and 4.0% respectively). Hypertension is the most frequently occurring cardiovascular condition. Of particular interest is the current certification of 263 airmen who have undergone coronary artery bypass. Some 324,986 active airmen (45%) require correction for some visual deficiency. Of this total, 20,355 are contact lens wearers. History of kidney stones is the most common

genitourinary/abdominal finding. Prevalence of pathology among active civil airmen, while still considerably less than among the general population, is increasing due to current and past emphasis on relaxation of regulatory requirements when consistent with safety. GRA

**N85-17534#** Virginia Univ., Charlottesville. Dept. of Neurosurgery.

**DIRECT ASSESSMENT OF SYNAPTIC MODIFICATION RULES Annual Scientific Report**

W. B. LEVY 15 Jun. 1984 5 p  
(Contract AF-AFOSR-0236-83; AF PROJ. 2312)  
(AD-A148376; AFOSR-84-1015TR) Avail: NTIS HC A02/MF A01 CSCL 06P

Our objectives are to quantify synaptic modification rules and to understand them in a context of simple neural networks capable of pattern recognition and clustering. The experimental work plus considerations of parsimony favors one particular form of the excitatory synaptic modification rule. Modification of the translation of synaptic activation into cell firing may well be governed by a separate rule. Although different than the first rule, simple computer models show these two rules are together compatible and noncontradictory. GRA

**N85-17535#** Michigan Univ., Ann Arbor. Perception Lab.  
**DISCRIMINABILITY OF SIGNALS FROM NOISE IN A DYNAMIC STEREOSCOPIC SPACE Final Report, 1 Oct. 1981 - 1 Sep. 1984**

W. R. UTTAL 30 Nov. 1984 28 p  
(Contract N00014-81-C-0266)  
(AD-A148406; PERLAB-5) Avail: NTIS HC A03/MF A01 CSCL 05J

The results of this work have been presented in two short reports and two long monographs which have been published as books. During the three years the project has been in existence 40 separate experiments have been carried out. The main mission of the project was to determine the manner in which constellations of dots were detected when embedded in random arrays of dots in two and three dimensions. GRA

**N85-17536#** Pennsylvania State Univ., University Park. Dept. of Industrial and Management Systems Engineering.

**ADVANCED DEVELOPMENT OF AN ACTIVE NEUROMUSCULATURE RESPONSE TO MECHANICAL STRESS Final Report, 15 Apr. 1983 - 31 Oct. 1984**

A. FREIVALDS 31 Oct. 1984 65 p  
(Contract AF-AFOSR-0106-83)  
(AD-A148436; AFOSR-84-1091TR) Avail: NTIS HC A04/MF A01 CSCL 06P

The objective of this project was to further define and formulate methodologies for implementing active muscle responses into the present ATB (Articulated Total Body) mathematical model. An active neuromusculature response to mechanical stress was further developed. The basic mechanisms of muscle contraction at the fiber level, including the length-tension relationship, the force-velocity relationship and the active state function were reexamined. The basic fiber mechanisms were integrated into muscle systems utilizing motor unit organization, orderly recruitment of motor units and adjustments in force due to fatigue. The complete muscle systems were then used to replicate the human neuromusculature of the trunk and neck and for the elbow, shoulder, hip and knee joints. Preliminary simulations were of the human response to high accelerations compared favorably to experimentally obtained values. This muscularized ATB Model will serve as a useful cost effective tool for the study of air crew responses in high-G environments. GRA

**N85-17537#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

**AN INVESTIGATION OF SPINAL INJURY POTENTIAL FROM THE USE OF THE ACES 2 EJECTION SEAT BY LOWER WEIGHT FEMALE PILOTS M.S. Thesis**

D. W. ABATI and M. F. BELCHER Sep. 1984 137 p  
(AD-A148449; AFIT/GSM/LSY/84S-1) Avail: NTIS HC A07/MF A01 CSCL 06S

Historically, ejection seat sled tests conducted to assess aviation injury potential to pilots have incorporated only the 5th through 95th percentile male weights. Since female pilots within the USAF have increased in number during the past seven years, it was estimated that risks associated with an ejection emergency for female pilots have not been adequately evaluated during ejection seat testing. The objectives of this thesis were to determine the percentage of female pilots who weigh less than the 5th percentile male and then to determine the spinal injury potential for these lower weight females with regard to the ACES 2 ejection seat. It was determined that the majority of female pilots are in a weight class below the 5th percentile male and that, based upon a computer model, the spinal injury potential is right at the acceptable limits. However, the authors caveat this second conclusion with the fact that a critical input to the computer that was used, the time-thrust curve for the DKU-5/A cartridge catapult, represented the thrust experienced by a 215 pound individual. Actual CKU-5/A test firings are scheduled to be accomplished in Sept. '84 before the second conclusion can be realistically accepted. GRA

**N85-17538#** National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors.

**PROCEEDINGS OF A WORKSHOP ON RESEARCH ISSUES IN SIMULATOR SICKNESS**

M. E. MCCAULEY, ed. Oct. 1984 80 p Workshop held in Monterey, Calif., 26-28 Sep. 1983 Sponsored in part by AF and Army  
(Contract N00014-81-C-0017; NR PROJ. 196-167)  
(AD-A148543) Avail: NTIS HC A05/MF A01 CSCL 06S

Simulator sickness, with symptoms similar to motion sickness, occurs frequently in military and civilian flight trainers. Simulator sickness appears to be independent of whether a fixed base or moving base simulator is used. Methods for amelioration are described as well as recommendations for future research to develop countermeasures. GRA

**N85-17539#** Midwest Research Inst., Kansas City, Mo.  
**EFFECTS OF PYRIDOSTIGMINE ON PSYCHOMOTOR AND VISUAL PERFORMANCE Final Report, 1 Apr. 1983 - 31 Aug. 1984**

C. GRAHAM and M. R. COOK Sep. 1984 92 p  
(Contract F33615-80-C-0606)  
(AD-A148553; AFAMRL-TR-84-052) Avail: NTIS HC A05/MF A01 CSCL 06O

Pyridostigmine is a reversible anticholinesterase inhibitor long used in the medical treatment of the neuromuscular disorder myasthenia gravis. Due to the site and the reversible nature of its action, this drug is currently being considered by the USAF for field use as a pretreatment medication to aid pilot survival in the event of a chemical attack. Medical reports indicate that high daily oral doses (600 mg/day) are well tolerated in patient populations. Recent NATO studies also suggest that lower dose regimens (30 mg, 3 x day, 30 days) can provide enhanced survival protection in nonclinical populations, with only minor gastric upset reported in a few individuals. Although health risks appear minimal, there exists a significant need to evaluate the impact of the drug on human functions important in pilot operations. The present study addressed this need. A double-blind, cross-over experimental design was used to evaluate the effects on oral regimen of pyridostigmine (30 mg, 3 x day, 5 days) on the performance, physiology, and subjective state of 24 paid, male volunteers.

Author (GRA)

## BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

**A85-19657#****VISUAL DISPLAY REQUIREMENTS FOR PILOT TRAINING IN AERIAL REFUELING**

R. E. CLAPP (Boeing Military Aircraft Co., Wichita, KS) American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 23rd, Reno, NV, Jan. 14-17, 1985. 10 p. refs (AIAA PAPER 85-0310)

This paper discusses the required performance parameters of the visual system display for pilot training in aerial refueling, both boom system and probe and drogue system, and compares such requirements with presently available visual display systems. Probe and drogue refueling imposes greater requirements upon the visual displays than does boom refueling systems, particularly in field of view and stereoscopic scenes. Because of the control difficulties of the air refueling pilot, the visual display should present a scene whose limitations are the pilot's eye. In general current display systems are unsatisfactory by at least an order of magnitude in resolution, scene detail and brightness; and by considerable factors in field of view and color. Current display systems are unable to duplicate the transfer of detail and stereoscopic scenes of the real world.

Author

**A85-19879****METHODOLOGICAL PROBLEMS RELATED TO THE USE OF FLIGHT SIMULATORS [PROBLEMY METODIKY NACVIKU NA LETECKYCH TRENAZERECH]**

J. PAVLIK Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1984, p. 279-281. In Czech.

The current methods of training relying on the use of flight simulators are examined, and their limitations are discussed. It is pointed out that training methods must depend on a knowledge of aircraft engineering psychology and of the flight environment, in particular. Problems related to the simulator-pilot interaction, simulator flexibility, and recording of flight parameters are discussed.

V.L.

**A85-19882****THE EXTENT OF THE REQUIRED SIMULATION OF SUBJECTIVE SENSATIONS ON A FLIGHT SIMULATOR [ROZSAH ZADOUCI SIMULACE SUBJEKTIVNICH POCITU NA PILOTNICH TRENAZERECH]**

J. SULC and J. CMIRAL (Ustav Leteckeho Zdravotnictvi, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1984, p. 289, 290. In Czech. refs

**A85-19883****THE NECESSITY AND POSSIBILITY OF THE SIMULATION OF PILOT'S PHYSIOLOGICAL SENSATIONS [POTREBNOST A MOZNOSTI SIMULACE POHYBOVYCH VJEMU PILOTA]**

K. JANSKA (Vyzkumny a Zkusebni Letecky Ustav, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1984, p. 291, 292. In Czech.

The functions of a pilot during flight and the origin of the associated sensations are reviewed in context of the simulation of these sensations during practice on flight simulators. The need for providing flight simulators with a system simulating the motions of an aircraft is demonstrated, and the requirements for such a system are formulated. The principle problems that have to be solved in developing such a system are examined.

V.L.

**A85-19884****RESULTS OF A PILOT QUESTIONNAIRE FOR SUBJECTIVE EVALUATION OF THE QUALITY OF SIMULATION OF PHYSIOLOGICAL SENSATIONS ON TL-410 AND TL-21 FLIGHT SIMULATORS [VYSLEDKY ANKETY SUBJEKTIVNIHO HODNOCENI DOSAZENE KVALITY SIMULACE POHYBOVYCH VJEMU NA TRENAZERECH TL-410 A TL-21]**

E. THONDEL (Rudy Letov, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1984, p. 293-295. In Czech.

**A85-19885****THE POSSIBILITIES AFFORDED BY THE USE OF FLIGHT SIMULATORS IN SOLVING PROBLEMS OF FLIGHT MECHANICS [MOZNOSTI VYUZITI VYZKUMNEHO POZEMNIHO SIMULATORU PRI RESENI ULOH V MECHANICE LETU]**

V. TICHOPAD (Vyzkumny a Zkusebni Letecky Ustav, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1984, p. 297, 298. In Czech.

The principal requirements for flight simulators designed for studying the flight characteristics of aircraft are briefly summarized. Specific types of problems in flight mechanics that can be solved using flight simulators are examined. The possibility of implementing such studies as the Aeronautical Research and Test Institute is discussed.

V.L.

**A85-20350****TEST STAND FOR INVESTIGATING THE PERFORMANCE OF THE OPERATOR OF AN ASTRONOMICAL TELEVISION SYSTEM**

G. M. VERZHBITSKAIA (Optiko-Mekhanicheskaya Promyshlennost', vol. 51, May 1984, p. 20-22) Soviet Journal of Optical Technology (ISSN 0038-5514), vol. 51, May 1984, p. 268-270. Translation.

The structural configuration of a test and a procedure for determining the performance of the operator of an astronomical television system, developed from the viewpoint of taking account of the functioning features his psychophysiological mechanism, are described. The specifications of the test stand are given.

Author

**A85-20676****MOTIVATIONAL SPHERE OF PERSONALITY AS A MANIFESTATION OF THE TOTALITY OF SOCIAL RELATIONSHIPS [MOTIVATSIONNAIA SFERA LICHNOSTI KAK PROIAVLENIE SOVOKUPNOSTI OBNOSHENIY OTNOSHENIY]**

V. I. KOVALEV (Akademii Nauk SSSR, Institut Psikhologii, Moscow, USSR) Psikhologicheskii Zhurnal, vol. 5, July-Aug. 1984, p. 3-13. In Russian. refs

**A85-20677****A MODEL FOR THE PROCESS OF RETAINING INFORMATION IN HUMAN MEMORY [MODEL' PROTSESSA UDERZHANIYA INFORMATSII V PAMIATI CHELOVEKA]**

V. F. PRISNIAKOV and L. M. PRISNIAKOVA (Dnepropetrovskii Gosudarstvennyi Universitet, Dnepropetrovsk, Ukrainian SSR) Psikhologicheskii Zhurnal, vol. 5, July-Aug. 1984, p. 29-36. In Russian.

**A85-20678****PSYCHOLOGICAL ASPECT OF PERSONALITY SELF-DETERMINATION [PSIKHOLOGICHESKII ASPEKT SAMOOPREDELENIYA LICHNOSTI]**

V. F. SAFIN and G. P. NIKOV (Bashkirskii Gosudarstvennyi Pedagogicheskii Institut, Ufa, USSR) Psikhologicheskii Zhurnal, vol. 5, July-Aug. 1984, p. 65-73. In Russian. refs

A85-20679

**INVESTIGATION OF EMOTIONAL STABILITY AND PSYCHOLOGICAL MEANS FOR ITS FORMATION IN ATHLETES [ISSLEDOVANIIE EMOTSIONAL'NOI USTOICHIVOSTI I PSIKHOLOGICHESKIE SREDSTVA EE FORMIROVANIIA U SPORTSMENOV]**

A. I. A. CHEBYKIN (Odesskii Gosudarstvennyi Pedagogicheskii Institut, Odessa, Ukrainian SSR) and L. M. ABOLIN (Volgogradskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Kazan, USSR) *Psikhologicheskii Zhurnal*, vol. 5, July-Aug. 1984, p. 83-89. In Russian. refs

A85-20680

**MEMORY AND THE CONSTRUCTION OF A SENSORY-PERCEPTUAL SPACE [PAMIAT' I POSTROENIE SENSORNNO-PERTSEPTIVNOGO PROSTRANSTVA]**

N. N. KORZH and N. G. ZUBOV (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR) *Psikhologicheskii Zhurnal*, vol. 5, July-Aug. 1984, p. 116-122. In Russian. refs

A85-20681

**SPATIAL-FREQUENCY SELECTIVITY OF ADAPTATION TO A COMPOSITE SINE-GRID [PROSTRANSTVENNO-CHASTOTNAIA IZBIRATEL'NOST' ADAPTATSII K SOSTAVNOI SINUS-RESHETKE]**

A. D. LOGVINENKO and G. E. CHERNAKOV (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) *Psikhologicheskii Zhurnal*, vol. 5, July-Aug. 1984, p. 123-132. In Russian. refs

Experiments performed with two trained subjects were used to study the spatial-frequency selectivity of the adaptation of the human visual system to a composite sine-grid (CSG), i.e., a superposition of sine grids. The adaptation to the composite grid is selective to spatial frequencies, and the adaptation effect (AE) is maximal at the frequencies of the component sine-grids. The curve of adaptation to the CSG is an envelope of curves of adaptation to the component sine-grids, and the absence of the summation of AEs after adaptation to the CSG indicates that the width of hypothetical channel bands of spatial frequencies is significantly less than an octave. The data support the hypothesis of channel interaction and contradict the hypothesis that the summation effect is due to fatigue of the spatial-frequency channels. B.J.

A85-20709

**FEATURES OF INTERHEMISPHERIC INTERACTIONS DURING THE MEMORIZATION OF INFORMATION [OSOBENNOSTI MEZHPOLUSHARNYKH VZAIMODEISTVII PRI ZAPECHATLENIII INFORMATSII]**

V. F. KONOVALOV and N. A. OTMAKHOVA *Voprosy Psikhologii* (ISSN 0042-8841), July-Aug. 1984, p. 96-102. In Russian. refs

An EEG analysis was used to assess sex-related differences in interhemispheric interactions observed in adult subjects whose tasks were to memorize three types of information: words, music, and numbers. In males, the largest number of statistically significant changes in the EEG occurred during the verbal task, while in females the largest number of such changes occurred during the music and counting tasks. Other sex-related differences were also examined, including those concerning the intensity and asymmetry of responses in either hemisphere. The general conclusion is that the functional asymmetry of the brain hemispheres is more pronounced in males than in females. B.J.

A85-20710

**FUNCTIONAL ROLE OF TEMPERAMENT TYPE IN THE INDIVIDUAL AND JOINT ACTIVITY OF PEOPLE [FUNKTSIONAL'NAIA ROL' TIPIA TEMPERAMENTA V INDIVIDUAL'NOI I SOVMESTNOI DEIATEL'NOSTI LIUDEI]**

V. V. BELOUS *Voprosy Psikhologii* (ISSN 0042-8841), July-Aug. 1984, p. 102-107. In Russian. refs

A85-20712

**METHOD FOR DETERMINING THE STRUCTURE OF A SMALL GROUP USING A FORMALIZED ANALYSIS OF INTERPERSONAL CHOICES [METODIKA OPREDELENIIA STRUKTURY MALOI GRUPPY S POMOSHCH'IU FORMALIZOVANNOGO ANALIZA MEZHLICHNOSTNYKH VYBOROV]**

A. S. GORBATENKO and T. M. GORBATENKO *Voprosy Psikhologii* (ISSN 0042-8841), July-Aug. 1984, p. 112-118. In Russian. refs

A85-20905

**HUMAN FACTORS IN AIRLINE TRAINING**

R. KOHN (Civil Aviation Authority, London, England) *Aerospace (UK)* (ISSN 0305-0831), vol. 12, Jan. 1985, p. 8-19.

Criteria are proposed for the selection of flight instructors for commercial airline pilot training programs. The criteria are based on a number of human factors which play a role in hands-on technical education: general education level; operational awareness; mechanical aptitude; and experience. Patience, considerateness, and an ability to control stressful situations are also considered to be important selection criteria. In addition to the selection criteria, recommendations are given with respect to approaches for improving trainee performance during the three stages of pilot training: the simulator phase; base training; and the final line training phase. I.H.

A85-21551

**SYMPOSIUM ON AVIATION PSYCHOLOGY, 2ND, COLUMBUS, OH, APRIL 25-28, 1983, PROCEEDINGS**

R. S. JENSEN, ED. (Ohio State University, Columbus, OH) Symposium sponsored by the Ohio State University. Columbus, OH, Ohio State University, 1984, 652 p. For individual items see A85-21552 to A85-21609.

Aspects of cockpit technology are discussed, taking into account color coding in fighter cockpits, the pilot-computer direct access interface provided by touch panels, performance evaluation of electronic flight instruments, a pilot's desk flight station, voice recognition technology as challenge of the 80's, synthesized voice and voice actuated control in the cockpit, and the cockpit display of traffic information and the threat alert and collision and avoidance system integration. Other topics explored are related to design reduced error, cockpit resource management, workload, judgment, pilot reliability, physiology and performance assessment, visual perception, selection, training, and simulation. Attention is given to progress in Army helicopter flight simulation, simulation as a national resource, strategy to the certification of private pilots, pilot performance evaluation involving human observer and computer, the identification of processes underlying skilled aviator performance, and an optic flow cueing model for low level flight. G.R.

A85-21552#

**COLOR CODING IN FIGHTER COCKPITS - IT ISN'T BLACK AND WHITE**

J. M. REISING and A. J. ARETZ (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 1-7. refs

The use of color in display formats is a topic which is causing a great deal of interest. One of the results of research in this area is that, for display formats of medium complexity, there is often no performance improvement with color displays - even though the operators overwhelmingly prefer color. Reducing subject viewing times and utilizing multivariate statistics are two approaches which may be able to differentiate the subtle performance variations between color and monochrome display formats of medium complexity. Author



**A85-21553#****THE PILOT-COMPUTER DIRECT-ACCESS INTERFACE - TOUCH PANELS REVISITED**

D. B. BERINGER (Wisconsin, University, Madison, WI) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 9-16. refs

It is pointed out that the present proliferation of computing power has brought with it a wider interest in the human-computer interface and means of optimization. A number of devices permit the human operator and the computer to interact through a common drawing surface. Use is made of the lightpen, lightgun, and a variety of touch-sensitive display overlays. A device considered by Beringer (1980) has the drawback of a relatively low resolution. The accuracy issue was studied by Beringer and Maxwell (1982) in a series of experiments. A description is presented of the first experiment. This experiment was designed to examine the possible existence of response biases in accuracy of designation (x,y) and in response time as a function of both target location on the display and the angle between the operator's line of sight and the display face. The obtained results are discussed. G.R.

**A85-21554#****PERFORMANCE EVALUATION OF ELECTRONIC FLIGHT INSTRUMENTS**

R. D. BLOMBERG (Dunlap and Associates East, Inc., Norwalk, CT), R. D. PEPLER, and J.-J. SPEYER (Airbus Industrie, Blagnac, Haute-Garonne, France) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 17-25.

It is pointed out that the cockpit design of the new generation of large jet transport aircraft includes electronic primary flight instruments and computerized flight management systems for navigation. An example of such a new generation aircraft is the European A310, which contains an Electronic Flight Information System (EFIS) that includes two CRT displays. The first replaces the standard Primary Flight Display (PFD) and provides the pilots with information on aircraft altitude, attitude, and airspeed, while autopilot (AP) flight mode and Instrument Landing System (ILS) data are also displayed. The second display is called the Navigation display. The A310 also includes a Flight Management System (FMS). Since the EFIS and FMS were new in transport aircraft, two separate experimental studies were conducted to assess aspects of overall performance impact on the pilot-aircraft system. Details regarding these studies and their results are discussed. G.R.

**A85-21563#****COCKPIT WORKLOAD IS THE TIP OF THE ICEBERG**

B. HARTMAN, H. HUGHES, S. SAMN, R. ALBANESE, and P. LOZANO (USAF, School of Aerospace Medicine, Brooks AFB, TX) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 109-113.

Cockpit workload and its growth are a factor which merits the attention it gets in the U.S. Air Force. However, in addition, there arise larger aspects of aircrew workload which must be investigated and managed. This conclusion is related to systems demands in the larger (perhaps organizational) context of major commands. There are, for example, multiday strategic airlift missions, and SAC flies 24-hour airborne missions. Workloads imposed by these operations are significant, though more in the cumulative sense in each duty day and across days than in the sense of instantaneous overload. The operations leading to such workloads have been studied in various ways, including a utilization of computer simulations. The results of the studies are discussed, taking into account system effects and systems stress, and the effects of system stress on aircrews. G.R.

**A85-21564\*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

**FLIGHT VERSUS SIMULATOR SCAN BEHAVIOR**

A. A. SPADY, JR. (NASA, Langley Research Center, Hampton, VA), R. L. HARRIS, SR. (Republic Airlines, Inc., Minneapolis, MN), and R. COMSTOCK IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 123-130. refs

It is pointed out that most of the modern flight simulators used for pilot training have included expensive motion bases, while the quantitative justification for motion is lacking. The present investigation is concerned with the effects of flight versus simulator conditions on scan behavior as a function of control mode and the presence or absence of traffic on the map display. Matching tests conducted in flight and in a fixed-base simulator permitted an evaluation of the differences in scanning behavior in the real world (flight) and in the 'less real' world (simulator). Scanning behavior in flight was found to be significantly different from the simulator. In flight, the dwell percentage increased on the Electronic Attitude Direction Indicator (EADI), and decreased on the Electronic Horizontal Situation Indicator (EHSI). The average dwell time on all instruments decreased in flight. G.R.

**A85-21565#****UNITED AIRLINES' COCKPIT RESOURCE MANAGEMENT TRAINING**

D. L. JACKSON (United Air Lines, Inc., Denver, CO) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 131-137. refs

This paper describes a unique pilot training program which focuses on five elements of synergistic cockpit crew teamwork. The five elements are: inquiry, advocacy, conflict resolution, critique and decision making. The Managerial Grid provides a theoretical basis for crew self-assessment of performance effectiveness on each of the five elements. The primary goal of this training program is to improve aviation safety. The data indicate a positive acceptance of the program by flight crewmembers and a positive effect upon their performance during annual proficiency checks. Plans for future data collection on United Airlines and recommendations for industry-wide data collection are discussed. Author

**A85-21566#****RESOURCE MANAGEMENT TRAINING FOR THE SMALL OPERATOR**

H. W. ORLADY (Battelle Columbus Laboratories, Mountain View, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 139-145. refs

The basic goals of cockpit resource management training are discussed. These goals are: insuring that established rules and procedures are followed routinely and without exception, making the 'crew concept' in practice do justice to the concept, maintaining a high level of flight safety awareness in all flight crew members, and taking constructive advantage of operational incidents. The second and fourth of these goals are emphasized, giving the most important problems to be solved and suggesting programs and other efforts to attain them. C.D.

**A85-21567#****THE PSYCHOLOGY OF COPILOT ASSERTIVENESS**

J. LEDERER (Southern California, University, Los Angeles, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 153-163. refs

Procedures for copilot takeover in the contingency of a captain's sudden physical incapacity have been standardized and widely accepted in the airline industry. This paper indicates the need for a similar policy to cope with mental or cognitive incapacity of a physically able and vocal captain. Several measures are listed to uncover and reduce the possibility of cognitive incapacity in flight as well as dealing with the impromptu event. Case histories are



offered to indicate the prompt need for attention and research.

Author

#### A85-21568#

##### **WORKLOAD ASSESSMENT FOR TWO-MAN CREW CERTIFICATION**

J. J. SPEYER and A. FORT (Airbus Industrie, Toulouse, France) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 185-200. refs

Questions regarding the crew needed for the developed aircraft led to the consideration of workload. For such a consideration, the Airworthiness Regulations provide a set of design-related, operational, and human factors parameters. According to the regulations, it is necessary to conduct an analysis and evaluation of the workload imposed upon the crewmembers of a particular type of aircraft by its cockpit environment. During the last three years, four types of workload study methods were developed. These methods are based on three functional attributes of input load (taskload), operator effort (workload), and output result (performance). Attention is given to the Static Taskload Analysis, the Dynamic Workload Analysis, and a method consisting of ambulant monitoring of heart rate.

G.R.

#### A85-21569#

##### **MESSAGE - AN EXPERT SYSTEM FOR AIRCRAFT CREW WORKLOAD ASSESSMENT**

G. A. BOY and C. TESSIER (ONERA, Centre d'Etudes et de Recherches de Toulouse, Toulouse, France) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 207-222. refs

A system of Crew and Aircraft Subsystems Models for the Management of Aircraft Equipment (CASMAE) is presented. The system is based on the results of human pilot modelling experiments carried out at ONERA since 1981. Individual interactive models of human performance in the operation of heavy transport aircraft are incorporated into the system, in order to simulate the data acquisition, planning, and execution processes which form the basis of pilot decision making. Some preliminary results from experimental simulations with the system are discussed. CASMAE is written in PASCAL to facilitate the definition of structured data and file management. An example of a recovery strategy tree used by the system is provided.

I.H.

**A85-21570\*#** Virginia Polytechnic Inst. and State Univ., Blacksburg.

##### **COMMUNICATIONS-IMPOSED PILOT WORKLOAD - A COMPARISON OF SIXTEEN ESTIMATION TECHNIQUES**

J. G. CASALI and W. W. WIERWILLE (Virginia Polytechnic Institute and State University, Blacksburg, VA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 223-235. refs (Contract NAG2-17)

Sixteen potential metrics of mental workload were investigated in regard to their relative sensitivity to communications load and their differential intrusion on primary task performance. A moving-base flight simulator was used to present three cross-country flights to each of 30 subject pilots, each flight varying only in the difficulty of the inherent communications requirements. With the exception of the rating scale measures, which were obtained immediately post-flight, all measures were taken over a seven minute segment of the flight task. The results indicated that both the Modified Cooper-Harper and the workload Multi-descriptor rating scales were reliably sensitive to changes in communications load. Also, the secondary task measure of time estimation and the physiological measure of pupil diameter yielded sensitivity. As expected, those primary task measures which were direct measures of communicative performance were also sensitive to load, while aircraft control primary task measures were not, attesting to the task-specificity of such measures. Finally, the intrusion analysis revealed no differential interference between workload measures.

Author

**A85-21571\*#** Systems Research Labs., Inc., Dayton, Ohio.

##### **ANALYTIC AND SUBJECTIVE ASSESSMENTS OF OPERATOR WORKLOAD IMPOSED BY COMMUNICATIONS TASKS IN TRANSPORT AIRCRAFT**

J. S. ECKEL (General Physics Corp., Dayton, OH) and M. S. CRABTREE (Systems Research Laboratories, Inc., Dayton, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 237-241. refs (Contract NAS2-11562)

Analytical and subjective techniques that are sensitive to the information transmission and processing requirements of individual communications-related tasks are used to assess workload imposed on the aircrew by A-10 communications requirements for civilian transport category aircraft. Communications-related tasks are defined to consist of the verbal exchanges between crews and controllers. Three workload estimating techniques are proposed. The first, an information theoretic analysis, is used to calculate bit values for perceptual, manual, and verbal demands in each communication task. The second, a paired-comparisons technique, obtains subjective estimates of the information processing and memory requirements for specific messages. By combining the results of the first two techniques, a hybrid analytical scale is created. The third, a subjective rank ordering of sequences of communications tasks, provides an overall scaling of communications workload. Recommendations for future research include an examination of communications-induced workload among the air crew and the development of simulation scenarios.

M.D.

**A85-21572\*#** Columbia Univ., New York.

##### **BEHAVIORAL INDICATORS OF PILOT WORKLOAD**

E. GALANTER and J. HOCHBERG (Columbia University, New York, NY) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 243-252. Previously announced in STAR as N83-34580.

(Contract NCC1-5)

Using a technique that requires a subject to consult an imagined or remembered spatial array while performing a visual task, a reliable reduction in the number of directed eye movements that are available for the acquisition of visual information is shown.

Author

#### A85-21574#

##### **HELICOPTER COPILOT WORKLOAD DURING NAP-OF-THE-EARTH FLIGHT**

D. O. COTE, G. P. KRUEGER, and R. R. SIMMONS (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, AL) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 289-298. refs

Two automatic navigation systems, a Doppler radar system and a projected map system, and a hand-held map were examined for their effects on copilot/navigator workload and performance. The automatic navigation systems reduced the number of navigation errors and the size of deviations from intended track. The Doppler system reduced the time devoted to navigating and the number of verbal navigation messages exchanged between the pilot and copilot. The projected map system reduced visual workload. However, with all three navigation systems, more than 80 percent of the copilot's time was spent on navigation tasks, less than 10 percent of their time was visual 'free time' that could be used for other tasks and greater than 20 percent of the aircrew's time was occupied with navigation communications.

Author

A85-21575#

**PILOT JUDGMENT TRAINING VALIDATION EXPERIMENT**

G. DE BAGHEERA (Transport Canada, Ottawa, Canada) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 307-316.

A revalidation of pilot judgment training materials developed by Embry-Riddle Aeronautics University (E-RAU) for the Federal Aviation Administration (FAA) is studied. The results of the study indicate that there are significant differences in the quality of evaluative judgments made by newly licensed pilots having studied the judgment training material when compared with those made by their equivalent counterparts who had not benefited from such training. It is shown that the combination of ground and flight judgment training has a beneficial effect on the subject's judgment. The homogeneity of the study group, the length of the training period, and the time of judgment measurement all pose restrictions upon the generalizations which can be made from the results obtained. Although the results validate the findings of E-RAU, it is recommended that further validation be carried out using students at the pilot training colleges and that flight instructors be sensitized to the results of this and other studies during the Civil Flight Instructor Refresher courses. M.D.

A85-21576#

**ELEMENTS OF PILOT JUDGMENT - A SURVEY**

D. A. CARAVELLA (FAA, West Chicago, IL) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 317-325.

The present investigation is concerned with the possibility that any particular measurable element relating to pilot judgment might correspond to contemporary accident data. Particular attention is given to a pilot's awareness of poor judgment as a causal factor in accidents, susceptibility to being induced to make poor judgments, tendency toward making poor judgments, and perceived importance placed on acquiring skills necessary to make good pilot judgments. The considered subjects were investigated on the basis of the answers obtained in a survey conducted with the aid of questionnaires. The significance of the obtained results is discussed, taking into account answers provided by commercial pilots, private pilots, ATP certificate holders, and students. G.R.

A85-21577#

**SYMPTOMS OF IMPENDING PILOT ERROR**

I. B. FRIES (Flying Physicians Association, Brick, NJ) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 327-330.

In the review of many aircraft accidents caused by pilot error, it is found that for some reason the pilot did not exercise his ability to avoid what happened. Such a failure can be related to such factors as not extending landing gear, running out of fuel, flying too low, landing too long or too short, taking off overweight, flying an aircraft out of balance, or with ice on its wings. The present investigation represents an attempt to identify the possible factors which lead to such blunders. It is believed that a pilot can be taught factors which contribute to errors, taught to recognize his own symptoms, and taught to take the appropriate action to ward off impending pilot error. The factors which form the basis for this hypothesis are discussed. It is thought that pilot error occurs when there is an imbalance between flight requirements and pilot capability, and that the pilot can recognize such an imbalance. G.R.

A85-21578\*# Ohio State Univ., Columbus.

**COMBINING DESTINATION DIVERSION DECISIONS AND CRITICAL IN-FLIGHT EVENT DIAGNOSIS IN COMPUTER AIDED TESTING OF PILOTS**

T. H. ROCKWELL, W. C. GIFFIN, and D. J. ROMER (Ohio State University, Columbus, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 343-351. refs (Contract NAG2-112)

Rockwell and Giffin (1982) and Giffin and Rockwell (1983) have discussed the use of computer aided testing (CAT) in the study of pilot response to critical in-flight events. The present investigation represents an extension of these earlier studies. In testing pilot responses to critical in-flight events, use is made of a Plato-touch CRT system operating on a menu based format. In connection with the typical diagnostic problem, the pilot was presented with symptoms within a flight scenario. In one problem, the pilot has four minutes for obtaining the information which is needed to make a diagnosis of the problem. In the reported research, the attempt has been made to combine both diagnosis and diversion scenario into a single computer aided test. Tests with nine subjects were conducted. The obtained results and their significance are discussed. G.R.

A85-21579#

**PILOT JUDGMENT TRAINING - PAST, PRESENT AND FUTURE**

G. S. LIVACK (General Aviation Manufacturers Association, Washington, DC) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 353-362.

Until very recently, conventional flight training was not concerned directly with proper judgment, because it appeared that 'judgment' could neither be taught, measured, or modified. However, in recent years, developments related to improved accident investigation technology have led to a growing realization of the significance of pilot judgment errors. A description is given of recent pilot judgment related projects, taking into account a U.S. Air Force program designed to teach judgment to the pilot, pilot judgment training activities initiated by a U.S. airline, judgment research efforts undertaken by the Federal Aviation Agency, and the development of a student pilot judgment training program for use in Canada. A proposed future, multifaceted, pilot judgment training program is also discussed. G.R.

A85-21580#

**INTEGRATION OF JUDGMENT TRAINING AND EVALUATION IN PILOT TRAINING PROGRAMS THROUGH A BETTER EDUCATIONAL TECHNOLOGY**

J. PARRISH (FAA, West Chicago, IL) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 375-383.

The present investigation has the objective to suggest a method of integrating judgment training in pilot training programs. In recent years, the emphasis placed on the development of good judgment behavior in pilots has increased considerably in the general aviation community. The meaning of the word 'judgment' in this investigation is based on an operational definition reported by Berlin et al. (1982). It refers to 'the mental process by which the pilot recognizes, analyzes, and evaluates information regarding himself, the aircraft, and the outside environment...'. The definition has three parts, related to information-processing, decision-making, and implementation (or execution). Attention is given to the assumptions made in the investigation, skill categories, the critical need for analysis, the analysis and instructional plan, and performance evaluation standards. G.R.

**A85-21581****THE MYERS-BRIGGS TYPE INDICATOR AS A TOOL TO IDENTIFY FLIGHT STUDENT'S LEARNING STYLES**

A. C. POWERS (AOPA - Air Safety Foundation, Bethesda, MD) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 385-391.

A test to identify the personality types of flight students has been developed. The test is based on Jung's (1923) theory of types and can be used to characterize the way an individual perceives his environment or judges events and actions. It is shown that an awareness of personality types during flight training makes it possible to modify training approaches to meet the specific needs of each student. The benefits of a more individual approach to flight training include greater retention of information and faster learning rates. A complete list of the different personality types is given in a table. I.H.

**A85-21583#****PILOT ERROR AS A SYMPTOM OF INADEQUATE STRESS COPING**

R. A. ALKOV, M. S. BOROWSKY, and J. A. GAYNOR (U.S. Navy, Naval Safety Center, Norfolk, VA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 401-405. refs

Psychological Questionnaires, completed on naval aviators who had been involved in major aircraft mishaps were divided into two groups. Those collected on aviators who were causally involved in their mishaps were compared to those collected on pilots who had no culpability in their mishap. Those who were assigned pilot error demonstrated symptoms of having problems with interpersonal relationships, an indication of 'acting out' behavior. 'Acting out' is a typical reaction for the aggressive, non-introspective individual who is not coping with life stresses well. It is hypothesized that the pilot factor mishap might be a symptom of inadequate stress coping as well. Author

**A85-21584#****ENHANCEMENT OF MILITARY PILOT RELIABILITY BY HYPNOSIS AND PSYCHOPHYSIOLOGICAL MONITORING - PRELIMINARY INFLIGHT AND SIMULATOR DATA**

A. F. BARABASZ (Harvard University; Massachusetts General Hospital, Boston, MA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 407-412. refs

Subjects were Royal New Zealand Air Force pilots and this investigator (N = 8). Skin conductance response (SCR) was measured during a localizer approach for both inflight and simulator phases of the study. SCR's were noted following all ground controller altitude and heading change instructions and for all pilot initiated heading and altitude changes employed to comply with the localizer approach plate. Inflight SCR's following ground controller instructions were substantially greater than those related to pilot initiated responses to cockpit information. In the flight simulator phase post hypnotic suggestions for increased vigilance performance were administered with counterbalancing for hypnosis-no-hypnosis order conditions. Cockpit instrument data was video taped. Post hypnotic instructions for enhanced vigilance performance were found to dramatically increase SCR's to cockpit based information and to significantly reduce heading and altitude error correction time. Author

**A85-21585#****EMOTIVE DISRUPTIONS - PERFORMANCE IMPLICATIONS**

G. P. CHUBB (AlphaTech, Inc., Alphascience, Dayton, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 413-420. refs

Results from a number of experimental investigations of emotive response in animals and humans are reviewed, in order to define the specific relation between frustration and anxiety responses in military operators. It is suggested that anxiety disrupts operator concentration, while frustration has the effect of increasing

concentration. In order to qualitatively evaluate the performance implications of the experimental data, a theoretical model of human operator concentration and task management is proposed, which takes into account the effects of emotive responses to unexpected events, plan invalidation or distorted information. I.H.

**A85-21586#****ON THE NATURE AND SOURCE OF HUMAN ERROR**

J. W. SENDERS (Toronto, University, Toronto, Canada; Maine, University, Orono, ME) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 421-427.

The fundamental characteristics of human error are examined. It is shown that most erroneous actions can be divided into constituent parts: errors in judgement; errors in perception; or errors in the execution of an action. It is pointed out that few experimental data exist for the sources of human error, and some applications of human error research are identified. A theoretical framework for the production of human error is proposed which takes into account the interrelations of the various intentional, perceptual, and exogenous aspects of human error. I.H.

**A85-21587#****ACCIDENT INVESTIGATION OF HUMAN PERFORMANCE FACTORS**

J. H. STOKLOSA (National Transportation Safety Board, Washington, DC) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 429-436.

There are a multiplicity of factors that have empirically been shown to affect and interact with human behavior/performance. This paper describes the factual information necessary for a detailed and systematic investigation of the human performance aspects of an accident. Six profile categories are established and provide the basis for the factual information to be collected. These include behavioral, medical, operational, task, equipment design, and environmental factors. The application of this concept has been successfully implemented in actual multi-modal accident investigations. Author

**A85-21588#****THE FUNCTIONAL AGE PROFILE - AN OBJECTIVE DECISION CRITERION FOR THE ASSESSMENT OF PILOT PERFORMANCE CAPACITIES AND CAPABILITIES**

R. J. BRAUNE and C. D. WICKENS (Illinois, University, Champaign, IL) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 437-444. refs  
(Contract N00204-82-C-0113)

**A85-21591#****PERFORMANCE ON A MEMORY AND SEARCH TASK (MAST) BY ARMY AVIATORS DURING A 21-DAY FIELD TRAINING EXERCISE**

B. E. HAMILTON (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, AL), N. R. ROSADO (U.S. Army, Fourth Infantry Div., Fort Carson, CO), and F. HEGGE (U.S. Army, Walter Reed Army Institute of Research, Washington, DC) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 457-464. refs

Five Army aviators took performance and affective tests twice a day for 15 days of a 21-day field training exercise. Accuracy on a memory-and-search task decreased significantly with concomitant increases in variability. Mood, activation level, and fatigue level were correlated significantly with the number of hours slept the night before. Greater decreases in accuracy were seen in those who averaged 6 hrs (+ or - 1.5) of sleep a night than in those who averaged 7 hrs (+ or - 1.6) per night. Author

**A85-21594#****COLOR DISCRIMINATION AS A FUNCTION OF SATURATION, FIELD SIZE AND ADAPTATION LEVEL**

F. E. WARD (Wright State University, Dayton, OH), F. GREENE, and W. MARTIN (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AF, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 481-487.

The purpose of this research was to investigate color discrimination under conditions of ambient illumination that may reduce CRT display saturation and contrast. The research measured both the variability of color matching and the offsets from a match necessary for a 100 percent discrimination difference. This was done for four dominant wavelengths each at five saturation levels. The subjects were tested at low, medium, and high adaptation levels for both large and small test stimulus sizes. In general, results for the low luminance color matching conditions are in agreement with the published literature. For the high luminance and small field conditions, the data suggest that color discrimination should not be predicted from the CIE Uniform Chromaticity Space data. Color discrimination varies dramatically with dominant wavelength; reds and greens are more difficult to discriminate than yellows and yellow-greens. Author

**A85-21595#****PSYCHOPHYSICAL ASSESSMENT OF SIMULATOR VISUAL DISPLAYS**

E. J. RINALDUCCI, M. J. PATTERSON (Georgia Institute of Technology, Atlanta, GA), J. DEMAIIO, and R. BROOKS (USAF, Human Resources Laboratory, Williams AFB, AZ) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 489-494. refs

The present study investigated the use of a psychophysical technique to provide a quick, low-cost evaluation of altitude cues provided by five visual display system conditions in which terrain features were varied in detail and density. Both pilot and non-pilot subjects were employed. Differences between pilots and non-pilots existed for the accuracy of altitude estimation, but the rankings of the effectiveness of the visual environments were the same for both groups. These results indicate that the use of non-pilot subjects can contribute to the overall cost-effectiveness and development of future is simulator displays. Author

**A85-21596#****USEFUL OPTICAL VARIABLES FOR DETECTING DECELERATING SELF MOTION**

S. B. TOBIAS and D. H. OWEN (Ohio State University, Columbus, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 495-501. (Contract AF-AFOSR-81-0078)

An experiment was conducted to determine the usefulness of several global optical variables in the detection of decelerating self motion. This exploratory investigation was designed to assess a wide range of values of initial global optical flow rate, invariant fractional loss in flow rate, and global optical texture density. Three levels of core duration (the duration of the period of the event upon which a judgment is made) and two levels of initial duration (the duration of the period of constant speed travel before the core duration began) were also examined. Performance improved with increases in both initial duration and core duration. Increasing the value of fractional loss in flow rate between events resulted in a large improvement in both accuracy and efficiency of performance. Author

**A85-21597#****THE FUNCTIONAL UTILITY OF OPTICAL FLOW ACCELERATION AS INFORMATION FOR DETECTING LOSS IN ALTITUDE**

L. J. HETTINGER, D. H. OWEN, and R. WARREN (Ohio State University, Columbus, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 503-511. refs (Contract AF-AFOSR-81-0078)

Optical analyses have identified three kinds of information for detection of loss in one's own altitude: (1) optical flow acceleration, (2) decrease in optical texture density and (3) increase in optical (perspectival) splay angle. An experiment was conducted contrasting constant descent rates which produced optical acceleration, with decreasing descent rates which produced constant optical flow. As found in earlier studies, observers were very sensitive to fractional loss in altitude. Eliminating optical flow acceleration, however, had little effect on an observer's detection of loss in altitude, indicating that changes in optical splay and/or optical texture density must be the salient sources of information. Varying initial texture density and event duration had no substantial effects on detection of descent. Author

**A85-21598#****EYEHEIGHT-SCALED VERSUS GROUND-TEXTURE-UNIT-SCALED METRICS FOR THE DETECTION OF LOSS IN ALTITUDE**

L. WOLPERT, D. H. OWEN, and R. WARREN (Ohio State University, Columbus, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 513-521. refs (Contract AF-AFOSR-81-0078)

Eyeheight-scaled and ground-texture-unit-scaled metrics are contrasted experimentally, with additional variable factors being the texture type (horizontal, square, and vertical), descent rate, and acceleration of optical flow. The test of a pilot's ability to detect changes in speed and altitude consisted of a 15-second computer-generated simulated flight event with a binary 'descent/level flight' response from the observer. Response time and confidence ratings were recorded during the 108 test trials. The results indicate significant superiority of the eyeheight metric, and a desirability for vertical or square texture due to their ability to provide splay information. The acceleration of optical flow is shown to have a hindering effect on the descent detection, contrary to previous similar experiments, which increases with higher flow rates. L.T.

**A85-21599#****FLYING TRAINING R&D AT THE AIR FORCE HUMAN RESOURCES LABORATORY**

H. J. CLARK and K. W. POTEPA (USAF, Human Resources Laboratory, Brooks AFB, TX) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 525-531. refs

This paper describes the Air Force Human Resources Laboratory and its research and development (R&D) programs in flying training. Studies in flight simulation, part-task trainer development, performance measurement, and pilot selection are described. R&D issues in flying training which merit continued attention are discussed, and opportunities for participation in Air Force sponsored R&D programs by universities and industrial organizations are briefly outlined. Author

**A85-21600#****RADICAL FACTORIAL CHANGES DURING PRACTICE AS MISINTERPRETATIONS OF FA RESULTS**

K.-M. GOETERS (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugmedizin, Hamburg, West Germany) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 533-539. refs

The psychological aptitude testing methodology of the Fleishman paradigm is applied to 12 reference tests intended to

measure subjects' perceptual speed, spatial orientation, visualization, and number/mathematical reasoning. The tests were practiced by 160 male applicants for pilot training, ranging from 20 to 24 years of age. It is demonstrated that after some initial rearrangement of correlations, which corresponds to warm-up and familiarization, there is a continuous activation of stable aptitude, rather than a total revolution of the performance structure. L.T.

#### A85-21601#

##### THE IDENTIFICATION OF PROCESSES UNDERLYING SKILLED AVIATOR PERFORMANCE

L. S. GOODMAN, D. K. MCBRIDE, J. M. OWENS (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, FL), and R. J. WHERRY, JR. (Analytics, Inc., Willow Grove, PA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-18, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 541-546. Navy-supported research.

The program 'Augmentation of Human Factors Engineering Technology Efforts', a basic research effort being executed by the Naval Aerospace Medical Research Laboratory, is briefly reviewed. The primary objective of the program is to provide meaningful, performance-based definitions of human operator capabilities and limitations across broad categories of aviation-relevant tasking and workload requirements. The specific objectives, goals, and payoffs include: (1) the development of a valid tasking and measurement system for defining human capabilities and limitations with respect to requirements in naval aviation; (2) the development of a process-based model of cognitive capabilities useful for predicting performance in the aviation environment; (3) the refinement of techniques to define and quantify operator workload capabilities in terms of mission/system demands; (4) the generation of a versatile research test-bed where fidelity to actual system requirements can be systematically manipulated; and (5) the development of a user-oriented human factor data base. V.L.

#### A85-21602#

##### THE USAF PILOT SELECTION AND CLASSIFICATION RESEARCH PROGRAM

J. E. KANTOR (USAF, Human Resources Laboratory, Brooks AFB, TX) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 547-552.

A battery of experimental tests to select combat pilot trainees for the US Air Force is described. The tests are given in a stand-alone format on computer and provided measures of behavior previously not available through traditional testing formats. Among the psychological parameters evaluated by tests are: psychomotor abilities; cognitive abilities; attitudinal characteristics; and personality traits. Some preliminary results of the tests are considered, within the context of a discussion concerning the usefulness of psychomotor testing, in general. I.H.

#### A85-21603#

##### PILOT PERFORMANCE EVALUATION - HUMAN OBSERVER VS. COMPUTER

T. M. MCCLOY, F. R. WOOD, and M. N. STOLLINGS (U.S. Air Force Academy, Colorado Springs, CO) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 553-557.

Thirty Air Force Academy cadets, fifteen males and fifteen females, participated in an experiment involving the acquisition of basic flying skills. This report compares human observer and computer evaluations of the subject's flying performance. Results indicated that both human observer and computer evaluations were reliable, with each having relative strengths and weaknesses. No clear-cut preference for either method is demonstrated; rather the appropriate choice of method appears to be determined by the specific demands of a given situation. Author

#### A85-21605#

##### BACK TO BASICS - SUGGESTED SOLUTIONS TO SOME FLIGHT INSTRUCTION PROBLEMS

R. TELFER (Newcastle, University, Newcastle, New South Wales, Australia) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 581-586. refs

Since 1976 a series of surveys of flight instructors and students in general and commercial aviation, and the Royal Australian Air Force, has indicated several common problems in flight instruction. These problems have provided a focus for instructor education programs described in this paper. Professional preparation of instructors in areas such as educational psychology (learning and memory, motivation, and skill acquisition) met with the approval of the participants, but no detectable change in instructional methods resulted. It is concluded that a commitment to the professionalization of flight instruction must come from within the occupational group. Author

#### A85-21610

##### A BRIEF HISTORY OF AVIATION PSYCHOLOGY

J. M. KOONCE (Massachusetts, University, Amherst, MA) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 499-508. refs

The history of aviation psychology since its beginnings during World War I is briefly reviewed, with an emphasis on the US development. Topics discussed include early pilot-selection testing by the military; the extensive testing and data-collection efforts undertaken during World War II; the roles of the universities, the airlines, and the CAA in the maturing and expansion of the field in the 1950s and 1960s; and the evolution of organizations and institutions. For the present, increased interest in areas such as cockpit design, communication systems, ATC, ground facilities, and advanced displays is indicated. T.K.

A85-21611\* Psycho-Linguistic Research Associates, Menlo Park, Calif.

##### SYNTHESIZED SPEECH RATE AND PITCH EFFECTS ON INTELLIGIBILITY OF WARNING MESSAGES FOR PILOTS

C. A. SIMPSON and K. MARCHIONDA-FROST (Psycho-Linguistic Research Associates, Menlo Park, CA) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 509-517. refs (Contract NAS2-11341)

In civilian and military operations, a future threat-warning system with a voice display could warn pilots of other traffic, obstacles in the flight path, and/or terrain during low-altitude helicopter flights. The present study was conducted to learn whether speech rate and voice pitch of phoneme-synthesized speech affects pilot accuracy and response time to typical threat-warning messages. Helicopter pilots engaged in an attention-demanding flying task and listened for voice threat warnings presented in a background of simulated helicopter cockpit noise. Performance was measured by flying-task performance, threat-warning intelligibility, and response time. Pilot ratings were elicited for the different voice pitches and speech rates. Significant effects were obtained only for response time and for pilot ratings, both as a function of speech rate. For the few cases when pilots forgot to respond to a voice message, they remembered 90 percent of the messages accurately when queried for their response 8 to 10 sec later. Author

A85-21612\* Technion - Israel Inst. of Tech., Haifa.

##### ON THE PSYCHOPHYSICS OF WORKLOAD - WHY BOTHER WITH SUBJECTIVE MEASURES?

D. GOPHER (Technion - Israel Institute of Technology, Haifa, Israel; Illinois, University, Champaign, IL) and R. BRAUNE (Illinois, University, Champaign, IL) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 519-532. refs (Contract NCC2-233; N00204-82-C-0113)

Psychophysical functions describe the relationship between variations in the amplitude of a defined physical quantity and the psychological perception of these changes. Examples are brightness, loudness, and pain. The regularities of these relationships have been formulated into psychophysical laws. The

measurement methodology of psychophysical scaling has been refined by the Harvard group led by Stevens (1957 and 1966), who proposed a power function as a general form for such laws. It is argued here that a similar scaling approach can be adapted to the measurement of workload and task demands based upon subjective estimates. The rationale is that these estimates, like other psychophysical judgments, reflect the individual's perception of the amount of processing resources that the subject invests to meet the demand imposed by a task. This approach was successfully applied to the assessment of 21 experimental conditions given to a group of 60 subjects. The paper discusses the main results of this effort and their implications to theory and application in human performance. Author

**A85-21613**

**PRINCIPLES OF S-C-R COMPATIBILITY WITH SPATIAL AND VERBAL TASKS - THE ROLE OF DISPLAY-CONTROL LOCATION AND VOICE-INTERACTIVE DISPLAY-CONTROL INTERFACING**

C. D. WICKENS (Illinois, University, Savoy and Urbana, IL), M. VIDULICH, and D. SANDRY-GARZA (Illinois, University, Urbana, IL) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 533-543. refs  
(Contract N00014-79-C-0658)

A pilot's tasks may be categorized into those that demand predominantly verbal operations and those that are spatial. Two experiments that define two principles of compatibility of interfacing such tasks with displays and controls are described. The first, based upon hemispheric-laterality effects, defines compatibility according to the display location and the response hand; the second defines compatibility according to the modality of display (auditory and visual) and response (manual and speech). Verbal tasks are best served by auditory inputs and speech response, whereas spatial tasks are best served by visual-manual channels. In both experiments, these principles of compatibility are confirmed under dual-task conditions. The implications for cockpit design are indicated. Author

**A85-21614\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**PILOT ERRORS AS A SOURCE OF WORKLOAD**

S. G. HART (NASA, Ames Research Center, Moffett Field, CA) and M. R. BORTOLUSSI (Behavioral Institute for Technology and Science, Inc., West Lafayette, IN) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 545-556. refs

A pilot opinion survey was conducted to develop a database for creating simulation scenarios that impose predetermined levels of pilot workload. Twelve pilots estimated the effect of 163 events and activities (which they had encountered during their previous flying experiences) on performance, effort, workload, and stress. The events, described in the context of flight scenario segments, included control, navigation and communications activities, aircraft and system failures, and pilot errors. In general, workload, stress, and effort ratings were significantly correlated with each other but not with performance ratings; however, some different response patterns were found as a function of flight segment (e.g., workload, stress, and performance, but not effort, ratings varied with flight phase) and type of event. Errors were rated as a significant source of change for workload, stress, and performance, suggesting that errors could be conceptualized as a cause of workload rather than as a symptom. Author

**A85-21615**

**AN INVESTIGATION OF THE EFFECTIVENESS OF PILOT JUDGMENT TRAINING**

G. BUCH (Canadian Air Transportation Administration, Ottawa, Canada) and A. DIEHL (FAA, Washington, DC) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 557-564. refs

The judgment skills of Canadian civilian air cadets who received judgment training both in the classroom and in flight while earning a private-pilot license were compared with the skills of a control group of cadets who received conventional training. The judgement skills of all subjects were measured during short well-structured

cross-country observation flights. The results indicate that those subjects who had received judgment training averaged fewer decisional errors than did their counterparts who had received the standard training only. These results suggest that pilot judgment can be improved with training. Author

**A85-21616**

**THE RELATIONSHIP BETWEEN PERSONALITY AND IRRATIONAL JUDGMENT IN CIVIL PILOTS**

L. F. LESTER and D. H. BOMBACI (Colby College, Waterville, ME) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 565-571. Research supported by the Colby College. refs

The construct validity of five 'hazardous thought patterns' that are hypothesized to mediate pilot judgment was examined in a sample of 35 civil pilots using a self-assessment inventory developed in previous FAA research. A significant relationship was observed between three of the hazardous thought patterns and scores on both the 16PF integration/self-concept control scale and the Rotter locus of control scale. No relationship to 16PF impulsivity or superego strength was noted. The implications for pilot training and certification are discussed. Author

**A85-21617\*** Ohio State Univ., Columbus.

**COMPUTER-AIDED TESTING OF PILOT RESPONSE TO CRITICAL IN-FLIGHT EVENTS**

W. C. GIFFIN and T. H. ROCKWELL (Ohio State University, Columbus, OH) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 573-581. refs  
(Contract NAG2-112)

This research on pilot response to critical in-flight events employs a unique methodology including an interactive computer-aided scenario-testing system. Navigation displays, instrument-panel displays, and assorted textual material are presented on a touch-sensitive CRT screen. Problem diagnosis scenarios, destination-diversion scenarios and combined destination/diagnostic tests are available. A complete time history of all data inquiries and responses is maintained. Sample results of diagnosis scenarios obtained from testing 38 licensed pilots are presented and discussed. Author

**A85-21618\*** Texas Univ., Austin.

**COCKPIT MANAGEMENT ATTITUDES**

R. L. HELMREICH (Texas, University, Austin, TX) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 583-589. refs  
(Contract NAG2-137)

Distinctions are drawn between personality traits and attitudes. The stability of the personality and the malleability of attitudes are stressed. These concepts are related to pilot performance, especially in the areas of crew coordination and cockpit resource management. Airline pilots were administered a Cockpit Management Attitudes questionnaire; empirical data from that survey are reported and implications of the data for training in crew coordination are discussed. Author

**A85-21619**

**APPLICATION OF A MULTIFACTOR APPROACH TO TRANSFER OF TRAINING RESEARCH**

C. W. SIMON (Essex Corp., Westlake Village, CA) and S. N. ROSCOE (New Mexico State University; Illiana Aviation Sciences, Ltd., Las Cruces, NM) Human Factors (ISSN 0018-7208), vol. 26, Oct. 1984, p. 591-612. refs

A multifactor multicriterion transfer-of-training experiment involving a computer-generated horizontal-tracking task was conducted to establish relationships among training and transfer scores for manual control of a maneuvering vehicle, to determine the response surfaces for training and transfer, and to demonstrate a new transfer-research paradigm that makes economically feasible the simultaneous investigation of the effects of a large number of training-equipment and use variables on transfer to multiple-criterion vehicle configurations. There were 80 experimental participants, 48 of whom were trained and tested on individually unique combinations of training and transfer conditions. This study measures the training and transfer effects of as many as six

training-equipment and use factors in a single experiment, to examine as many as 25 training-vehicle configurations in the same experiment, trains a single individual on each of 48 training conditions, employs multiple (3) transfer vehicle configurations, and provides data suitable for deriving multiple-regression equations for estimating the transfer effectiveness of configurations not directly studied. Author

**A85-21850\*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**DYADS AND TRIADS AT 35,000 FEET - FACTORS AFFECTING GROUP PROCESS AND AIRCREW PERFORMANCE**

H. C. FOUSHEE (NASA, Ames Research Center, Moffett Field, CA) American Psychologist (ISSN 0003-066X), vol. 39, Aug. 1984, p. 885-893. refs

The task of flying a multipilot transport aircraft is a classic small-group performance situation where a number of social, organizational, and personality factors are relevant to important outcome variables such as safety. The aviation community is becoming increasingly aware of the importance of these factors but is hampered in its efforts to improve the system because of research psychology's problems in defining the nature of the group process. This article identifies some of the problem areas as well as methods used to address these issues. It is argued that high fidelity flight simulators provide an environment that offers unique opportunities for work meeting both basic and applied research criteria. Author

**N85-16419#** Joint Publications Research Service, Arlington, Va. **EFFECTS OF INDIVIDUAL MNEMONIC CHARACTERISTICS ON PROBLEM SOLVING Abstract Only**

L. D. GORBUNOVA In *its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-015) p 28 19 Jul. 1984 Transl. into ENGLISH from *Psikhologicheskii Z. (Moscow)*, v. 4, no. 6, Nov. - Dec. 1983 p 106-108 Avail: NTIS HC A06

Psychophysiological analysis of work performance conducted with 81 individuals demonstrates that different operational problems rely on different types of memory. Decoding of multi-dimensional signal systems within a limited time frame relies primarily on efficient short-term memory processes. However, operations resting on continuous diagnosis of a variable situation and decision-making responses demands an overall high-degree of mnemonic efficiency and especially long-term retention. Evaluation of individual performance on short-term and long-term memory tests may prove to be of value in determining occupational suitability. Author

**N85-16420#** Joint Publications Research Service, Arlington, Va. **MENTAL STATUS IN RELATION TO SPECIAL CONDITIONS OF ACTIVITY Abstract Only**

N. D. ZAVALOVA and V. A. PONOMARENKO In *its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-015) p 29 19 Jul. 1984 Transl. into ENGLISH from *Psikhologicheskii Z. (Moscow)*, v. 4, no. 6, Nov. - Dec. 1983 p 92-105 Avail: NTIS HC A06

The role of mental status in relation to human performance in the man-machine-environment setting was evaluated with particular emphasis on situations in which there is no in-flight awareness of faulty performance by a pilot. The basic premise is that outside influences, e.g., environmental factors such as hypoxia, affect mentation and lead to erroneous perception such an analysis are inappropriate to the situation at hand but, within the framework of the altered mental state, are not perceived as such despite their dire consequences, particularly in in-flight situations. A solution to such problems would require a systems approach treating of mentation separately from normal somatic function as well as in concert with the latter. Such an approach may provide an objective evaluation to the dissociation between subjective perceptions and the quality of analysis which leads to certain actions that may not be appropriate to the situation as a whole. Author

**N85-16464#** Manchester Univ. (England). Dept. of Management Sciences.

**JOB AND FAMILY STRESS AS PREDICTORS OF PILOT HEALTH, JOB SATISFACTION AND PERFORMANCE Final Scientific Report, 1 May 1983 - 30 Apr. 1984**

C. L. COOPER and S. J. SLOAN May 1984 239 p

(Contract AF-AFOSR-0148-83)

(AD-A142176; EOARD-TR-84-18) Avail: NTIS HC A11/MF A01 CSCL 05J

The objective of the study was to investigate the occupational and domestic sources of pilot mental ill health and performance. Using a psychosocial approach, the major trends and predictive issues were to be identified. These would not only provide extensive information but also form the basis for further research and wider practical application. Relevant background literature was reviewed. It was concluded that while a small amount of previous research had been performed relevant to the area of present investigation, it was of only limited practical utility. Comparisons with data derived from other occupations revealed that equivalent research in pilots was clearly deficient. This was particularly true in the examination of domestic sources of stress. Extensive preliminary interviews were performed to investigate the situations, highlight key issues and to generate items that could be further psychometrically tested in the main study. GRA

**N85-16465#** Army Command and General Staff Coll., Fort Leavenworth, Kansas.

**CAN THE AGGRESSORS CONTINUE TO BE EFFECTIVE IN THE F-5E? M.S. Thesis**

D. M. KREMPEL 1 Jun. 1984 96 p

(AD-A146861; AD-E751146) Avail: NTIS HC A05/MF A01

CSCL 05I

The Aggressors were established with the mission to provide realistic, enemy oriented, dissimilar air combat tactics training for United States Air Force fighter units. They accomplished this mission since 1973 with first the Northrop T-38 and now the Northrop F-5E. The F-5E is an acceptable simulator of the Soviet built MIG-21 Fishbed which was originally produced in the early 1960's. This is 1984 and the Russian air combat threat has changed into a more sophisticated fighter force. This study examined the capability of the F-5E to simulate modern Soviet air combat fighters, specifically, the MIG-23 Flogger, MIG-31 Foxhound, MIG-29 Fulcrum, and SU-27 Flanker. The investigation revealed that the F-5E is not an acceptable simulator for any of these aircraft. The upgraded F-5E with an improved radar, proved to be able to serve a part-task simulator for only the MIG-23 Flogger. (author) GRA

**N85-16466#** Air Force Human Resources Lab., Brooks AFB, Tex.

**PRACTICE MAKES PERFECT Interim Technical Paper. Jan. 1982 - Jul. 1983**

E. L. MARTIN Oct. 1984 13 p

(Contract AF PROJ. 1123)

(AD-A147124; AFHRL-TP-84-32) Avail: NTIS HC A02/MF A01 CSCL 05I

This paper is an outgrowth of research and development in the application of flight simulation to training air-to-ground combat missions. Numerous discussions with subject-matter experts led to the opinion expressed in this paper that today's pilots do not get the amount of practice at each skill level that would be required for them to achieve their full potential. Unfortunately, task flying frequency requirements are driven by logistics and finances more than training requirements. This paper offers the notion that if pilots were trained in the same way as athletes are trained, substantial improvements in mission effectiveness would result. In the end, everyone stands to lose if pilots are not given the very best training that technology has to offer. Author (GRA)



**N85-17522#** Joint Publications Research Service, Arlington, Va.  
**INFLUENCE OF ACTIVATION OF ASFS-2 ON HUMAN EMOTIONAL STATUS Abstract Only**

A. V. MIROLYUBOV, I. L. SOLOMIN, and A. Y. SHIKIN *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-001) p 23 7 Jan. 1985 Transl. into ENGLISH from Fiz. Cheloveka (Moscow), v. 10, no. 4, Ju. - Aug. 1984 p 674-675*

Avail: NTIS HC A03/MF A01

The moderating effect of rhythmic photostimulation in treating organic hyperkinesia such as Parkinson's disease was studied. The change in emotional status of healthy persons after a series of artificial stable functional connections (ASFS-2) stimuli was investigated. It was noted that during the therapeutic photostimulation, the hyperkinesia decrease and the mental status of the patient improves noticeably, manifested as an increase in the level of mental activity, improvement in general feeling, and an increase in volume of short-term memory. Group 1 received a single injection of 30 mg of ethimizol i/m. Group 2 received sessions of photostimulation with a gas discharge photostimulator at 15 Hz for 5 seconds. Group 3 received the injection of ethimizol, followed 30 minutes later by photostimulation (asfs-2). The course of ASFS-2 stimulation significantly activated and balanced the emotional state of the subjects, as a result of involvement in the artificial stable connection of the emotiogenic structures of the brain. R.S.F.

**N85-17540#** Pittsburgh Univ., Pa. Western Psychiatric Inst. and Clinic.

**COGNITIVE ASYMMETRY AND OCCUPATION. COMPUTER PROGRAMMERS, STUDENTS, AND BANK PERSONNEL, PART 1 AND PART 2**

H. W. GORDON and K. KRONZ Sep. 1984 33 p

(Contract N00014-83-K-0208)

(AD-A147125; TR-09-84-03) Avail: NTIS HC A03/MF A01 CSCL 05J

System analysts and computer programmers of a university computer center performed better on visuospatial tasks usually attributed to the right cerebral hemisphere. By contrast, subjects from a human resources department of a bank performed better on verbal/sequential tasks associated with the left hemisphere. The cognitive profile was significantly different although the overall performance was not different between the groups. In a second study with an intermediate computer class, there was a significant correlation between the cognitive profile favoring visuospatial skills and scores on computer projects in which the students used their own ingenuity. There was no correlation with scores that depended on class notes or with scores on examinations. These results suggest that knowing the cognitive profile may be important in determining success in certain occupations. GRA

**N85-17541#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

**AN INVESTIGATION OF THE RELATIONSHIP BETWEEN STRESSFUL LIFE EVENTS AND PSYCHOLOGICAL, BEHAVIORAL AND PHYSIOLOGICAL OUTCOMES M.S. Thesis**

B. E. NIELSEN and R. L. TREMAINE Sep. 1984 105 p

(AD-A147754; AFIT/GSM/LSY/84S-23) Avail: NTIS HC A06/MF A01 CSCL 05J

Individuals in organizations are subjected to stress from a variety of sources. Problems and uncertainties on and off-the-job can cause stress in the individual. Stress effects have been estimated in 1983 to cost American organizations over 50 billion dollars annually. In an attempt to assess the impact of stress on Department of Defense personnel, the Air Force Institute of Technology administered the Life Events Survey (LES) to 76 individuals, measuring variables associated with 83 potentially stressful life events. Additionally, these participants completed a multi-inventory Stress Assessment Package (SAP-2) and contributed blood samples. This thesis statistically explored the relationship between the major stressful life events as measured in the LES and the following variables measured by the SAP-2: (1) perceived off-the-job stress, (2) perceived on-the-job stress, (3) ratio of total blood cholesterol with high density lipoprotein

cholesterol, (4) job satisfaction, (5) intent to remain, and (6) Type A behavior characteristics. Job related stressful life events were found to be significantly related to job satisfaction and Type A behavior, and the life event of Vacations was found to be significantly related to the ratio of total blood cholesterol to HDL cholesterol. Author (GRA)

**N85-17542#** Electronic Systems Div., Hanscom AFB, Mass.

**TRAINING GUIDE FOR SCIENTIFIC AND ENGINEERING TRAINEES 1984**

Jun. 1984 24 p

(AD-A147963; ESD-TR-84-184) Avail: NTIS HC A02/MF A01 CSCL 05I

This Training Guide is to provide a unique opportunity to selected graduate engineers, mathematicians, and computer scientists to acquire applicable knowledge and experience in technical management with the guidance of the Electronic Systems Division Scientific and Engineering Career Panel. It is to provide trainees with an effective and meaningful entry into a technical management career. GRA

**N85-17543#** Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Flight Dynamics Lab.

**THE VALUE AND UTILITY OF INFLIGHT ONBOARD SIMULATION Final Report, Jul. 1983 - Jul. 1984**

J. A. KOCHER Sep. 1984 101 p

(Contract AF PROJ. 2506)

(AD-A148033; AFWAL-TR-84-3092) Avail: NTIS HC A06/MF A01 CSCL 05I

Onboard Simulation (OBS) provides computer-generated synthetic targets which are projected in the pilot's head-up display (HUD). The target changes size and perspective to account for relative position between the target and attacker. OBS was flight test demonstrated in the USAF Integrated Flight and Fire Control (IFFC) advanced development program. A review of IFFC experience with OBS is provided, including an estimate of direct cost savings attributed to OBS. A decision analysis is performed to assess the use of OBS for operational pilot training in aerial gunnery. Results indicate a training mix of OBS synthetic target encounters balanced with real target encounters can improve the quality of training. GRA

**N85-17544#** Perceptronics, Inc., Woodland Hills, Calif.

**COMPATIBILITY EFFECTS AND PREFERENCE REVERSALS**

A. TVERSKY and P. SLOVIC 21 Aug. 1984 110 p

(Contract N00014-82-C-0643)

(AD-A148399; PFTR-1127-84-8) Avail: NTIS HC A06/MF A01 CSCL 05J

Recent studies of decision making show that people's preferences among risky and riskless prospects often depend on the manner in which the options are described or framed. Much as changes in vantage point alter the apparent size of objects, different representations of a given decision problem induce predictable changes in preferences. These findings violate the normative principle of invariance, which states that the preference order between prospects should not depend on the manner in which they are described. This study investigates the effect of elicitation method on preferences among simple gambles. Three strategically equivalent elicitation procedures, choice, pricing, and attractiveness rating, produced reversals of preference when the same pairs of gambles were evaluated under different procedures. These results are attributed to the compatibility effect, a tendency to weight more heavily those aspects of the stimulus that are most easily mapped into the response. This phenomenon is described by a differential weighting model in which the effect of the elicitation procedure on the relative weighting of the stimulus attributes is expressed by a bias parameter  $b$ . Implications of these and related findings for the theory and the practice of decision making are discussed. GRA



**N85-17545#** Illinois Univ., Champaign. Human Attention Research Lab.

**TRAINING HIGH PERFORMANCE SKILLS: FALLACIES AND GUIDELINES Final Report, 1981 - 1983**

W. SCHNEIDER Aug. 1984 21 p

(Contract N00014-81-K-0034; NR PROJ. 154-460)

(AD-A148574; HARL-ONR-8301) Avail: NTIS HC A02/MF A01 CSCI 051

A high performance skill is defined as one which: over 100 hours of training are required, substantial numbers of individuals fail to develop proficiency, and the performance of the expert is qualitatively different from that of the novice. Training programs for developing high performance skills are often based on assumptions that may be appropriate for simple skills. These assumptions can be fallacious when extended to high performance skills. Six fallacies of training are described. Empirical characteristics of high performance skill acquisition are reviewed. These include long acquisition periods, heterogeneity of component learning, development of inappropriate strategies, and training of time-sharing skills. A tentative set of working guidelines for the acquisition of high performance skills is described. GRA

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### MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

**A85-19466#**

**SPACE STATION REMOTE MANIPULATOR REQUIREMENTS DEFINITION**

B. A. LOGAN, JR. (Rockwell International Corp., Space Station Systems Div., Downey, CA) American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 23rd, Reno, NV, Jan. 14-17, 1985. 4 p.

(AIAA PAPER 85-0029)

An essential element of the Space Station is the remote manipulator. It will be used for assembly of the Space Station from the modules brought up by the National Space Transportation System (NSTS), for handling of payloads/experiments on the Space Station, for grappling and berthing co-orbiting spacecraft (including the orbiter), and for assembly of large space structures. The operational and assembly uses are examined to define the requirements that these uses impose on the Space Station remote manipulator. These requirements include degrees-of-freedom (such as translation of the mounting base), reach envelope, loads capacity, stopping distance, translational and rotational rates, positioning accuracy, etc. Finally, the capabilities of the orbiter remote manipulator system are compared with the requirements of the Space Station remote manipulator. Author

**A85-19557#**

**LOW COST SIMULATION OF A UH-1 TRAINING MISSION USING ARRAY PROCESSORS-PILOT PERFORMANCE EVALUATION**

K. S. KRISHNAKUMAR American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 23rd, Reno, NV, Jan. 14-17, 1985. 10 p. refs

(AIAA PAPER 85-0160)

Features and performance capabilities of a UH-1 helicopter pilot flight training simulator designed with cost in mind are described. The FPS 100 array processor was selected to handle computations of the Euler body axes equations of motion, Euler's angles, inertial velocities, the mechanical control system and engine torque, and atmospheric gust statistics. The system was configured to simulate the total aerodynamic forces and moments for the six degree of freedom motion equations with fully nonlinear kinematics expressed as a Taylor series expansion about a reference trim trajectory. The display, driven by two microprocessors, furnishes

out-the-cockpit-window color graphics night scenes with mirror-beam-splitter optics, which furnish the scenes independent of the pilot head motions. Instrument displays include the airspeed, altitude, rate of climb, heading, torque pressure, side slip, and turn. Details of the training course map and scoring methods are outlined. M.S.K.

**A85-19880**

**USING A FLIGHT SIMULATOR FOR THE ANALYSIS OF THE SENSOR MOTOR RESPONSES OF PILOTS [VYUZITI LETECKEHO SIMULATORU K ANALYZE SENZOMOTORICKYCH REAKCI PILOTA]**

J. CMIRAL (Ustav Leteckeho Zdravotnictvi, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1984, p. 283, 284. In Czech.

In the course of a study aimed at an objective evaluation of pilot skills, an analysis was made of the effect of training on the sensor motor responses of pilots and their ability to foresee their own actions. It was established that training has a positive effect on the sensor motor responses, while no evidence was obtained to support the conclusion that training improves eye-to-hand coordination characteristics. V.L.

**A85-19881**

**USING A FLIGHT SIMULATOR IN STUDIES OF THE EFFECT OF FLIGHT WORKLOAD ON THE PHYSIOLOGICAL REACTIONS OF PILOTS DURING PRACTICE [LETECKY SIMULATOR VE VYZKUMU VLIVU LETOVE ZATEZE NA FYZIOLOGICKE REAKCE PILOTU V PRUBEHU VYCVIKU]**

J. CMIRAL and J. SULC (Ustav Leteckeho Zdravotnictvi, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no. 5, 1984, p. 285, 286. In Czech.

**A85-20275**

**VOCAL COMMAND IN AVIATION [LA COMMANDE VOCALE EN AERONAUTIQUE]**

R. AMALBERTI and J.-P. MENU (Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris, France) Medecine Aeronautique et Spatiale, vol. 23, no. 92, 1984, p. 322-326. In French. refs

The application of vocal communication to the man-machine interface in a modern fighter aircraft is discussed in a review of recent experiments and technological developments. The principles of communication theory are introduced; the information input to the pilot is characterized and shown to be dominated by the visual component at present; the advantages of a more balanced distribution of perceptive tasks and of vocal communication in particular are outlined; and the technological and human limitations of current vocal systems are indicated. It is shown that vocal-input systems (using synthetic speech to provide data, warnings, or instructions) are already in use and can be easily expanded, but that vocal-command systems (using voice analyzers and encoders to permit voice operation of the aircraft or armaments) are not yet operational and have evoked only limited interest from pilots (as measured using questionnaires). T.K.

**A85-20504**

**FUNDAMENTALS OF THE DESIGN OF LIFE SUPPORT SYSTEMS FOR THE CREW OF A SPACECRAFT [OSNOVY PROEKTIROVANIIA SISTEM ZHIZNEOBESPECHENIIA EKIPAZHA KOSMICHESKIKH LETATEL'NYKH APPARATOV]**

V. N. SEREBRIAKOV Moscow, Izdatel'stvo Mashinostroenie, 1983, 160 p. In Russian. refs

The conduction of space flights with manned vehicles requires an employment of appropriate systems for supporting the crew during the mission. This book is concerned with the design of such life support systems. The characteristics and the classification of the required systems are examined, taking into account exchange processes between crew member and environment, the characteristics of the environment provided by the life support systems, the composition and the objectives of the various systems, the particular conditions accompanying a space flight, and the technical requirements regarding onboard systems. Approaches

for providing the required composition of the atmosphere are considered along with the means employed to control temperature and humidity, water supply, problems of waste removal and sanitation, procedures for pressure regulation, and thermal regulation. Attention is also given to the regeneration of oxygen from carbon dioxide, water from human biological waste products, the design of the apparatus for life support systems, and different versions of life support systems. G.R.

**A85-20600\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EFFECT OF SURFACTANTS AND TEMPERATURE ON THE HYPERFILTRATION PERFORMANCE OF POLY(ETHER/UREA) MEMBRANES**

M. I. LEBAN and T. J. WYDEVEN (NASA, Ames Research Center, Moffett Field, CA) *Environmental Science and Technology* (ISSN 0013-936X), vol. 18, Oct. 1984, p. 778-780. refs

The individual and combined effects of pasteurization temperature (347 K) and surfactants (anionic, cationic, and neutral) on a poly(ether/urea) thin-film hyperfiltration membrane were studied. Performance of this positively charged membrane was measured in terms of sodium chloride rejection and water flux. The observed effect was mostly on water flux and minimal on salt rejection. Pasteurization temperature caused an irreversible flux decline (flux decline slope of 0.09). The gradual flux reduction caused by neutral and cationic surfactants was reversible, whereas the flux reduction caused by anionic surfactant was irreversible and of similar magnitude to flux reduction caused by pasteurization temperature. The effects of anionic surfactant and pasteurization temperature were additive. Because of flux decline at elevated temperatures the poly(ether/urea) membrane is not very attractive for long-term spaceflight use. Author

**A85-20652**

**VISIBLE RADIATION AND STANDARDS RELATING TO IT IN OCCUPATIONAL HYGIENE [VIDIMAIA RADIATSIIA I EE NORMIROVANIE V GIGIENE TRUDA]**

IU. D. ZHILOV and E. N. NAZAROVA *Gigiena i Sanitariia* (ISSN 0016-9900), Sept. 1984, p. 13-17. In Russian. refs

The techniques used to develop occupational health standards for visible radiation are described. Attention is given to three interrelated factors which can be used to determine the physiological effects of light in the workplace: brightness; visual performance; and the adaptation of the eyes. On the basis of an analysis of experimental measurements, an optimal work surface luminosity of 600 cd per sq m is recommended which corresponds to the brightness threshold of the pupillary reflex. I.H.

**A85-20654**

**HYGIENIC ASSESSMENT OF CERTAIN BRANDS OF RUBBER AND THE POSSIBILITY OF USING THEM IN WATER SUPPLY SYSTEMS [GIGIENICHESKAIA OTSENKA NEKOTORYKH MAROK REZIN I VOZMOZHNOST' IKH ISPOL'ZOVANIIA V PRAKTIKE KHOZIAISTVENNO-PIT'EVOGO VODOSNABZHENIIA]**

V. V. TSAPKO, V. N. KUPYROV, L. M. SHMARGUN, R. K. GAKAL, A. IA. RESHOTKA, N. V. MARTYSHCHENKO, S. N. STARCHENKO, and V. C. KONOVALOV (*Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR*) *Gigiena i Sanitariia* (ISSN 0016-9900), Sept. 1984, p. 23-25. In Russian.

**A85-20656**

**HYGIENIC SUBSTANTIATION OF THE POSSIBILITY OF USING NEW BRANDS OF POLYOLEFINS (PROPYLENE-ETHYLENE COPOLYMER) IN THE FOOD INDUSTRY [GIGIENICHESKOE OBOSNOVANIE VOZMOZHNOSTI ISPOL'ZOVANIIA V PISHCHEVOI PROMYSHLENNOSTI POLIOLEFINOV NOVYKH MAROK /BLOKSOPOLIMERA PROPYLENA S ETILENOM/]**

D. D. BRAUN, T. G. VORONEL, and L. A. MOSHLAKOVA (*Moskovskii Nauchno-Issledovatel'skii Institut Gigieny, Moscow, USSR*) *Gigiena i Sanitariia* (ISSN 0016-9900), Sept. 1984, p. 34-37.

**A85-20657**

**THE QUESTION OF HYGIENIC REGULATIONS FOR THE ELECTROMAGNETIC FIELDS OF RADAR SYSTEMS [VOPROSY GIGIENICHESKOGO NORMIROVANIIA ELEKTROMAGNITNYKH POLEI RADIOLOKATSIONNYKH SISTEM]**

IU. D. DUMANSKII, D. S. IVANOV, N. G. NIKITINA, and L. A. TOMASHEVSKAIA (*Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR*) *Gigiena i Sanitariia* (ISSN 0016-9900), Sept. 1984, p. 37-40. In Russian.

Methodological issues are raised in the development of hygienic standards for the electromagnetic fields of radar systems operating at frequencies greater than 300 MHz. An equation is formulated which can be used to determine the basic risk factor associated with the installation of radar stations near population centers. It is shown that current standards do not take into account the intermittent operational regimes of radar systems, and therefore do not conform to actual operational characteristics. The correlation between current hygienic standards and the power characteristics of radar systems is found to be valid only for meteorological radar systems. I.H.

**A85-20658**

**DEVICE FOR DETERMINING THE SPATIAL COORDINATION OF HAND MOVEMENTS [PRIBOR DLIA OPREDELENIIA PROSTRANSTVENNOI KOORDINATSII DVIZHENII RUKI]**

G. I. KUTSENKO, E. I. SOSHNIKOV, and B. N. MINCHIN (*Vsesoiuznyi Nauchno-Issledovatel'skii Institut Sotsial'noi Gigieny i Organizatsii Zdravookhraneniia, Moscow, USSR*) *Gigiena i Sanitariia* (ISSN 0016-9900), Sept. 1984, p. 49-51. In Russian.

**A85-20662**

**METHODOLOGICAL APPROACHES TO THE DETERMINATION OF THE DIMENSIONS OF RADIATION-PROTECTION ZONES AROUND TV BROADCASTING CENTERS AND TV RELAY TRANSMITTERS [METODICHESKIE PODKHODY K OPREDELENIIU RAZMEROV SANITARNO-ZASHCHITNYKH ZON VOKRUG TELETSENTROV I TELEVIZIONNYKH RETRANSLIATOROV]**

IU. D. DUMANSKII, D. S. IVANOV, I. I. KARACHEV, S. V. BITKIN, and V. M. PAVLOVA (*Kievskii Nauchno-Issledovatel'skii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR*) *Gigiena i Sanitariia* (ISSN 0016-9900), Aug. 1984, p. 62-65. In Russian. refs

**A85-20665**

**DEVELOPMENT OF THE CONCEPT OF CONTROL LEVELS WITH APPLICATION TO THE PRACTICE OF RADIATION CONTROL [RAZVITIE KONTSEPTSII KONTROL'NYKH UROVNEI PRIMENITEL'NO K PRAKTIKE RADIATSIONNOGO KONTROLIA]**

E. V. DEVIATAIKIN and IU. V. ABRAMOV (*Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR*) *Gigiena i Sanitariia* (ISSN 0016-9900), Sept. 1984, p. 92, 93. In Russian.

**A85-20706**

**STEP DEVICE FOR THE AUTOMATIC DETERMINATION OF PHYSICAL WORK CAPACITY [PRIBOR DLIA AVTOMATIZIROVANNOGO OPREDELENIIA FIZICHESKOI RABOTOSPOSOBNOSTI S POMOSHCH'IU STUPEN'KI]**

V. K. SOSNOVSKII and N. V. KOROLEV (*Simferopol'skii Gosudarstvennyi Universitet, Simferopol, Ukrainian SSR*) *Teoriia i Praktika Fizicheskoi Kul'tury* (ISSN 0040-3601), Aug. 1984, p. 57, 58. In Russian.

**A85-20713**

**INTERACTIVE SYSTEM FOR THE PREPARATION AND PRESENTATION OF VISUAL INFORMATION [DIALOGOVAIA SISTEMA PODGOTOVKI I PRED'IAVLENIIA ZRITEL'NOI INFORMATSII]**

A. P. KULAICHEV, D. M. RAMENDIK, and M. V. SLAVUTSKAIA (*Voprosy Psikhologii* (ISSN 0042-8841), July-Aug. 1984, p. 118-120. In Russian.

A85-20727

**INVESTIGATION OF THE COMBINED EFFECT OF VIBRATION AND NOISE ON AGRICULTURAL TRACTORS AND MOTORIZED MACHINES AND THE PROBLEM OF HYGIENIC STANDARDIZATION (REVIEW OF THE LITERATURE)**  
[IZUCHENIE KOMBINIROVANNOGO VOZDEISTVIA VIBRATSII I SHUMA SEL'SKOKHOZIAISTVENNYKH TRAKTOROV I SAMOKHODNYKH MASHIN I ZADACHI GIGIENICHESKOI REGLAMENTATSII /OBZOR LITERATURY/]

V. I. CHERNIUK (Institut Gigeny Truda i Profzabolevani, Kiev, Ukrainian SSR) Gigiena Truda i Profesional'nye Zabolevaniia, Sept. 1984, p. 35-37. In Russian. refs

A85-20731

**SUCCESS IN RECEIVING BALLS DEPENDING ON VELOCITY, DIRECTION, AND DURATION OF BALL-FLIGHT TRACKING [USPESHNOST' PRIEMA MIACHEI V ZAVISIMOSTI OT SKOROSTI NAPRAVLENIIA I DLITEL'NOSTI PROSLEZHIVANIIA IKH POLETA]**

V. M. ZATSIORSKII, S. V. GOLOMAZOV, and M. KH. KAZIEV (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Aug. 1984, p. 12-14. In Russian. refs

A85-21463#

#### **MAN-MACHINE INTEGRATION**

G. ROE (British Aerospace, PLC, Brough, N. Humberside, England) IN: Design and advanced concepts of avionics/weapons system integration; Proceedings of the Symposium, London, England, April 3, 4, 1984. London, Royal Aeronautical Society, 1984, 9 p.

Attention is given to British studies addressing questions of pilot cockpit task optimization, and the overall system architecture required to meet the operational requirements imposed for next-generation tactical combat aircraft in the sphere of communications. The Tactical Combat Aircraft Avionics Demonstrator Rig is devoted to the investigation of such issues as total system integration, interface standardization, effective subsystem intercommunication, system degradation amelioration, and improved maintenance procedures. The architecture under development has a multibus hierarchy, and implements data transmission standard 1553B for subsystem-to-subsystem and bus-to-bus communication. Emphasis is given to the influence of pilot needs on system design and implementation. O.C.

A85-21464#

#### **WHEN DOES THE MAN-MACHINE INTERFACE BECOME FLIGHT CRITICAL?**

W. H. MCKINLAY (Ferranti, PLC, Cheadle, Essex, England) IN: Design and advanced concepts of avionics/weapons system integration; Proceedings of the Symposium, London, England, April 3, 4, 1984. London, Royal Aeronautical Society, 1984, 5 p.

In designing integrated cockpit systems, the man-machine interface problem comprises several facets: (1) the high level conceptual design of the system must establish pilot and avionics roles clearly; (2) the cockpit data displayed must suffice for the pilot's direct manual commission of a task or his monitoring of that task's delegation to automated control features with confidence; (3) automated system behavior must be congruent with the pilot's own cognitive processes; and (4) flight-critical relationships between man and machine call for the provision of redundant information and automatic monitoring. Conservatism is essential in arriving at design solutions for flight-critical man-machine interface systems, so that application in commercial or less critical military systems is recommended. O.C.

A85-21556#

#### **VOICE RECOGNITION TECHNOLOGY - CHALLENGE OF THE 80S**

H. GREGOIRE (Southern California, University, Los Angeles, CA) and D. BIER (Dayton, University, Dayton; Systems Research Laboratories, Inc., Kettering, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 37-44. refs

Advances of work related to the recognition of words in the human voice by inanimate systems and devices has led to a speech recognition typewriter in Japan in the early 1960s and to machines capable of reacting to digits spoken by humans, as reported by Kosuya (1982). It is pointed out that the decade of the 80s promises to be the most progressive era thus far in expanding the potential of the human voice. In aviation, voice actuated systems will give the pilot the possibility to initiate operations while his hands are occupied with other tasks, while a voice stress detection system can provide valuable information regarding the stress under which a pilot or air traffic controller is operating. The problems which have to be solved in connection with the implementation of suitable voice actuated systems in aviation are discussed. G.R.

A85-21557#

#### **SYNTHESIZED VOICE AND VOICE ACTUATED CONTROL IN THE COCKPIT**

R. L. HILGENDORF (Midland-Ross Corp., Grimes Div., Urbana, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 45-53. refs

Presented is the rationale for pursuing voice technology for cockpit applications. The increasing focus in this technology results from increased information capabilities and demands, crew composition, and cockpit architectures. Also presented is an overview of the design and functional description of an aural warning unit (AWU), currently in the production design phase, to be used as an adjunct with a master caution and warning system in commuter aircraft. The AWU processes inputs from failure or status sensors and provides aural warning output. In addition, a summary of program plans is presented for the implementation of Voice Actuated Control (VAC) in the cockpit. The suggestion is made that one of the first promising applications of VAC is to serve as an acknowledgement function for a new microprocessor driven flat panel display master caution and warning system with AWU capability. Author

A85-21558#

#### **COMPUTER-ANIMATED DISPLAYS FOR VERTICAL AND TRANSLATIONAL FLIGHT**

S. N. ROSCOE (New Mexico State University, Las Cruces, NM) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 55-67. refs

A conceptual analysis and review of human factors problems in piloting VTOL aircraft including helicopters is presented. VTOL mission and flight requirements are contrasted with those of CTOLs. Deficiencies in present VTOL flight instrumentation are summarized. An experimental approach that is based on established display principles and emphasizes dynamically predictive skeletal, perspective, vertical and horizontal situation displays is presented. Author

A85-21560#

#### **DISPLAYS, DEJA VU**

R. B. HUNTOON (Rockwell International Corp., Collins Government Avionics Div., Cedar Rapids, IA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 77-84. refs

This paper is intended to briefly review the development and status of avionics and human engineering with particular emphasis on human engineering recommendations and requirements as applied to current display technology. Existing and near term cockpit management systems are used to illustrate potential areas for

human factors specialists, and some suggestions, indicated by recent cockpit display research, are offered. Author

## A85-21561#

### SPEECH TECHNOLOGY - PRESENT AND FUTURE APPLICATIONS IN THE AIRBORNE ENVIRONMENT

C. A. PORUBCANSKY (USAF, Directorate of Avionics Engineering, Wright-Patterson AFB, OH) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 85-94. refs

It is pointed out that workload in today's high performance tactical aircraft is approaching the limit of pilot capability. Possibilities for integrating tasks to reduce this workload are, therefore, investigated. Some of the possibilities for reducing the pilot's workload are based on the utilization of voice actuated systems and voice synthesis systems. The Air Force is, therefore, conducting studies regarding the feasibility to recommend voice systems as viable alternatives for reducing pilot workload in weapon systems, particularly aircraft, of the future. A description is presented of background information which will provide a basic understanding of speech recognition and synthesis techniques. Attention is also given to a study concerned with 'Speech Technology in an Air-to-Ground Cockpit', a study intended to assess speech technology, studies regarding a speech interactive system, and future Air Force programs. G.R.

A85-21562\*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

### AIRCRAFT AUTOMATION - THE PROBLEM OF THE PILOT INTERFACE

H. P. BERGERON (NASA, Langley Research Center, Hampton, VA) and D. A. HINTON IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 95-102. refs

In recent years, aviation has been experiencing a rapid growth. This growth is expected to continue, and aircraft operations in the IFR (instrument flight rules) environment, for example, are predicted to increase dramatically in the next 10 to 12 years. However, it has been found the IFR accidents are increasing at about the same rate as IFR operations, because an associated high workload can lead to human error. For this reason, NASA and others are exploring the use of aircraft systems technology as a means for reducing the pilot workload and enhancing the safety and utility of the aircraft operations. However, recent research has shown that automation, implemented with insufficient consideration to the human factors interface, can frequently create more problems than it solves. Some of this research is discussed, examples of the encountered problems are shown, and solutions regarding the arising problems are suggested. G.R.

## A85-21573#

### DIGITAL MODELLING OF PILOT WORKLOAD IN HIGH SPEED HIGH PERFORMANCE AIRCRAFT

C. J. KESSEL (Perceptronics Man Machine Systems, Tel Aviv, Israel), M. BRICKNER (Israel Air Force, Tel Aviv, Israel), Z. ALLON (Israel Aircraft Industries, Ltd., Tel Aviv, Israel), and A. SEIDMANN (Tel Aviv University, Tel Aviv, Israel) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 279-287. refs

Sixteen simulated flight missions were run using two different mission scenarios, manual control and autopilot control. The missions were run using an adaptation of the pilot simulation model (PSM) developed using SLAM (A simulation language for alternate approaches to modelling). It has been shown that using this methodology, different mission success rates and different pilot work load measures can be produced. It was also shown that while this methodology cannot adequately substitute for experimentation in dynamic simulators, it does provide a useful tool early on in the design process in a cost effective fashion. Author

## A85-21589#

### AUTOMATED PERFORMANCE MEASUREMENT FOR NAVAL AVIATION - APARTS, A LANDING SIGNAL OFFICER TRAINING AID

C. A. BRICTON (Dunlap and Associates West, Inc., La Jolla, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 445-448. Navy-sponsored research.

Development of the Automated Performance Assessment and Remedial Training System (APARTS) is described. APARTS is an automated training aid designed to assist the Landing Signal Officer (LSO) in training pilots during the acquisition of carrier landing skills. APARTS is based on general principles of learning and provides graphic displays of pilot landing technique problems for LSO evaluation and pilot feedback. APARTS also integrates Field Carrier Landing Practice (FCLP), conducted in the aircraft, with Night Carrier Landing Trainer (NCLT) instruction. Landing technique problems are identified and fed back to the pilot as a basis for remedial instruction in the NCLT trainer. APARTS is designed to process, store and graphically display pilot landing performance data, including the type, frequency and location of problems. Application of APARTS data has improved initial carrier landing performance, reduced cost and provided normative data for training evaluation. The evolution of the program to its present operational status is an example of how automated performance measurement can be applied to Naval aviation. Author

## A85-21590#

### MEASURING THE PILOT PERFORMANCE EFFECTS OF NEUROTOXICOSIS

J. A. DELLINGER and H. L. TAYLOR (Illinois, University, Savoy, IL) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 449-456. refs

The Aviation Research Laboratory has developed a methodology for evaluating toxicant effects on pilot performance. Flight data are collected using a digital flight simulator, the ILLIMAC (ILLinois Micro Aviation Computer) during holding patterns and an instrument landing system approach. The flight data are recorded by a separate microcomputer which also presents a secondary task, Sternberg's choice reaction time. A preliminary study examined pilot performance in the simulator and cholinesterase inhibition by insecticides in agricultural pilots. The correlation between the physiological parameters and the pilot performance data was determined. Experiments are planned to determine the effects of a variety of drugs on pilot performance. Neurotoxicants to be studied include ethanol, three anti-emetic drugs, and atropine sulfate. Author

## A85-21592#

### A COMPUTER SIMULATION OF VISUAL DETECTION PERFORMANCE DERIVED FROM PUBLISHED DATA

V. J. GAWRON, K. R. LAUGHERY, JR. (Calspan Corp., Boulder, CO), C. C. JORGENSEN (U.S. Army, Research Institute, Fort Bliss, TX), and J. POLITO (Pritsker and Associates, Inc., Albuquerque, NM) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings. Columbus, OH, Ohio State University, 1984, p. 465-471. (Contract MDA903-81-C-AA06)

As part of an ongoing program to develop a computer Model of Operator Performance in an Air Defense System (MOPADS), a numerical model of visual detection has been developed. The purpose of the model is to calculate the probability of detecting a target as a function of a number of independent variables, including target type, horizontal target range, apparent contrast on the monitor screen, and the search area. In order to demonstrate the effectiveness of the model, experimental simulations were performed for two different sets of conditions. The results of the simulations are discussed, and a simplified portion of the programming sequence for the model is given. I.H.

**A85-21604#****NEW METHODOLOGY FOR TRANSFER EXPERIMENTS ON SIMULATOR DESIGN**

C. W. SIMON (Canyon Research Group, Inc., Westlake Village, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 573-580. refs

In 1953, a study was conducted with the objective to design an experiment which would provide the data needed to define pilot training simulator requirements. It was found that there were 34 important factors and that each factor should be studied at five levels. An implementation of the experiment on the basis of traditional experimental methodology was impossible. The present investigation is concerned with a new holistic approach for conducting transfer-of-training experiments. A 'holistic' approach represents an improved way of planning, designing, analyzing, and interpreting empirical data collected under controlled conditions. According to the considered approach, the only way to obtain accurate and precise experimental information which will generalize to a wide variety of operational situations is to include all of the potentially critical factors in the same experiment and to make certain that the range of values for each factor in the experiment overlaps those anticipated operationally, now and in the future.

G.R.

**A85-21606#****SIMULATOR SICKNESS - A SPECIAL CASE OF THE TRANSFORMED PERCEPTUAL WORLD. I - SCOPE OF THE PROBLEM**

L. H. FRANK (U.S. Navy, Naval Training Equipment Center, Orlando, FL), R. S. KELLOGG (Dayton, University, Williams AFB, AZ), R. S. KENNEDY (Canyon Research Group, Inc., Orlando, FL), and M. E. MCCAULEY (Canyon Research Group, Inc., Westlake Village, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 587-596. refs

The available data for the incidence etiology and the factors contributing to motion sickness in flight simulators are reviewed. It is found that psychophysiological disturbances during flight simulator runs may continue several hours after the simulation flight simulation. Disruptive effects were observed in equal proportions in pilots, aircrews, and instructors. Recommendations are offered with respect to areas of future research, and some techniques for alleviating the adverse symptoms of simulator sickness are identified.

I.H.

**A85-21607\*# Decision-Science Applications, Inc., Arlington, Va. TAC BRAWLER - AN APPLICATION OF ENGAGEMENT SIMULATION MODELING TO SIMULATOR VISUAL SYSTEM DISPLAY REQUIREMENTS FOR AIR COMBAT MANEUVERING**

R. M. KERCHNER (Decision-Science Applications, Inc., Arlington, VA), R. G. HUGHES (USAF, Human Resources Laboratory, Williams AFB, AZ), and A. LEE (NASA, Ames Research Center, Moffett Field, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 599-606.

The TAC BRAWLER air combat simulation models both the acquisition and use of visual information by the pilot. It was used to provide the designers of manned simulators for air-to-air combat with information regarding the training implications of display system resolution, inherent target contrast, field of view, and transport delay. Various display designs were simulated, and the resulting quantitative and qualitative differences in engagements were considered indicators of possible mistraining. Display resolution was found to alter combats primarily through its effect on detection ranges; the 'pixel averaging' contrast management technique was shown to largely compensate for this problem. Transport delay significantly degrades pilot tracking ability, but the training impact of the effect is unclear.

Author

**A85-21608#****VISUAL SIMULATION TASK AND CUE ANALYSIS**

D. C. MCCORMICK (Singer Co., Link Flight Simulation Div., Sunnyvale, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 607-613.

A Task and Cue Analysis (TACA) is required by many new military flight simulator visual system specifications. The TACA is part of a design procedure to insure that the delivered system provides the aircrew with visual imagery that contains adequate information for effective training. It directs data base design in a structured analytical manner to meet the aircrew's perceptual requirements. The design of a simulator visual system requires that many engineering tradeoff decisions be made. A TACA guides these decisions with respect to aircrew training and perceptual requirements. This produces a visual simulation which supplies necessary information with a high degree of perceptual fidelity.

Author

**A85-21609#****PROGRESS IN ARMY HELICOPTER FLIGHT SIMULATION**

G. D. SIERING (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, AL) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 615-620. Army-supported research. refs

Army research and development of helicopter flight simulators is reviewed with emphasis on the cost and training effectiveness of the Synthetic Flight Training System. The current utilization of simulators in pilot training is given. Advances in cost and training effectiveness methodology are discussed. Recommendations for future research and study are developed.

Author

**A85-22151#****INDIGENOUSLY DEVELOPED LIQUID COOLED SUIT AND ITS PERFORMANCE**

J. K. GUPTA, J. S. SANT, C. A. VERGHESE, and D. K. BHATT (Indian Air Force, Institute of Aviation Medicine, Bangalore, India) Aviation Medicine, vol. 28, June 1984, p. 12-20. refs

A liquid-cooled flight suit (LCS) has been developed in order to reduce the heat loads encountered by combat aircraft pilots during low-altitude operation in summer. The refrigeration unit for the suit is a 24-volt pump which can be connected to cooling manifolds within the suit by capillary tubing. On the basis of physiological evaluations in a simulated hot-cockpit environment, it is found that the LCS reduced the rise in heart rate due to excessive heat loads by 76 percent. When a cutaway anti-G suit was worn over the LCS, protection against centrifugal stress was reduced by an average of 0.175 G. It is suggested that this reduction represents an improvement over previous LCS designs which reduced protection against centrifugal stress by an average of 0.53 G. Several photographs and schematic drawings of the suit are provided, and the complete results of the physiological evaluations are presented in a series of tables.

I.H.

**A85-22504****A METHOD FOR DETERMINING THE ANAEROBIC-EXCHANGE THRESHOLD FOR LUNG VENTILATION DURING RUNNING [METOD OPREDELENIYA POROGA ANAEROBNOGO OBMENA PO LEGOCHNOI VENTILIATSII PRI BEGE]**

E. B. MIKINCHENKO, I. Z. BIKBAEV, V. N. SELUIANOV, and R. K. KOZMIN (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriya i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), Sept. 1984, p. 21, 22. In Russian.

A ventilation meter has been developed for measuring running speed at the level of the anaerobic-exchange threshold during cyclic exercise. This speed can be determined with high accuracy (0.075 m/s), and it is noted that this speed parameter can serve as an informative and reliable diagnostic indicator in sports medicine.

B.J.

**N85-16417#** Joint Publications Research Service, Arlington, Va.  
**ESTABLISHMENT OF POSTURE AND WORKING MOVEMENTS OF PILOT IN AIR CRASH ENQUIRIES Abstract Only**

A. V. KLYUYEV and V. N. ARTEMOV *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-015) p 1 19 Jul. 1984 Transl. into ENGLISH from Sudebno-Med. Ekspertiza (Moscow), no. 3, Jul. - Sep. 1984 p 11-12*  
 Avail: NTIS HC A06

Experts' opinion concerning the whereabouts, condition, and actions of air crew members at the time of a crash provide valuable information during an air accident inquiry. An example of how such information is gained is given. The second pilot's position in the plane's cabin and his actions at the time of a crash are determined by analysis of flight parameters at the moment of crash, location of the cabin after the crash, speed of the plane at impact, and injuries found on the body of the pilot. Experimental modelling of injuries to crew members inside of a plane of the same type as the one involved in the crash also provide important information concerning a crash. Author

**N85-16418#** Joint Publications Research Service, Arlington, Va.  
**SPEECH-ACTION INTERRELATIONSHIPS IN OPERATIONAL WORK Abstract Only**

N. V. KRYLOVA and A. K. BOKOVIKOV *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-015) p 28 19 Jul. 1984 Transl. into ENGLISH from Psikhologicheskii Z. (Moscow), v. 4, no. 6, Nov. - Dec. 1983 p 48-53*  
 Avail: NTIS HC A06

The temporal and logical relationship between speech and motor activity were evaluated within the framework of an operator's performance. The quality of the report was evaluated in terms of the complexity of the task to be accomplished. In many situations in which tracking movements of increasing complexity had to be performed, the quality of the oral report improved. This fact was attributed to the concentration of the psychological reserves on the task at hand which apparently favored greater mental efficiency. The simultaneous combination of an oral report and motor activity resulted in the situation where the report either preceded or followed the physical manipulation. Author

**N85-16429#** Joint Publications Research Service, Arlington, Va.  
**MODELING OF HUMAN MOTION BY COMPUTER CONSIDERING MEASUREMENT ERRORS IN INITIAL DATA Abstract Only**

A. V. ZINKOVSKIY and V. A. CHISTYAKOV *In its USSR Rept.: Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-84-027) p 37 27 Dec. 1984 Transl. into ENGLISH from Biofiz. (Moscow), v. 29, no. 4, Jul. - Aug. 1984 p 694-695*  
 Avail: NTIS HC A08

The statistical characteristics of joint moments were analyzed when there were errors in the mass-inertia characteristics of a biomechanical system and errors arising upon recording and computation of the kinematics of motion. In addition, statistical characteristics of the synthesized motion on a computer were studied when there were errors in joint moments which appeared due to the finite word length of the digital computer. Assuming randomness and independence of errors in determination of the inertial tensors, the dispersions of errors in joint moments are found. With errors arising due to inaccurate knowledge of kinematics of the moving biomechanical system, a method of Gaussian approximation was used to filter errors of measurement. R.S.F.

**N85-16467** Department of the Air Force, Washington, D.C.  
**HELMET MOUNTED TELESCOPE Patent**

H. L. TASK and C. BATES, JR., inventors (to Air Force) 15 Nov. 1982 4 p Supersedes AD-D010221  
 (AD-D011355; US-PATENT-4,465,347;  
 US-PATENT-APPL-SN-441814; US-PATENT-CLASS-350-538)  
 Avail: US Patent and Trademark Office CSDL 06Q

An improved helmet is provided including means to telescopically acquire an image of a field of view, which comprises, a telescopic optical system including an objective lens mounted to said helmet above the line of sight of the wearer, a

light-conducting fiber optics bundle mounted to said helmet for receiving the image from the objective lens, and collimating lens for receiving the image from the fiber optics bundle and projecting the image onto a helmet-mounted visor in the line of sight of the wearer. A shutter, remotely controllable by the wearer, may be disposed intermediate the objective lens and display to selectively block transmission of the image. Author (GRA)

**N85-16468\*#** United Technologies Corp., Windsor Locks, Conn.  
**DEVELOPMENT OF A PREPROTOTYPE TIMES WASTEWATER RECOVERY SUBSYSTEM, ADDENDUM Final Report, Feb. 1982 - Jul. 1984**

G. F. DEHNER Oct. 1984 116 p

(Contract NAS9-15471)

(NASA-CR-171823; NAS 1.26:171823; SVHSER-7236-REV-A)

Avail: NTIS HC A06/MF A01 CSDL 06K

Six tasks are described reflecting subsystem hardware and software modifications and test evaluation of a TIMES wastewater recovery subsystem. The overall results are illustrated in a figure which shows the water production rate, the specific energy corrected to 26.5 VDC, and the product water conductivity at various points in the testing. Four tasks are described reflecting studies performed to develop a preliminary design concept for a next generation TIMES. The overall results of the study are the completion of major design analyses and preliminary configuration layout drawings. R.S.F.

**N85-16469\*#** New Hampshire Univ., Durham. Complex Systems Research Center.

**PROBLEMS ASSOCIATED WITH THE UTILIZATION OF ALGAE IN BIOGENERATIVE LIFE SUPPORT SYSTEMS**

M. M. AVERNER, M. KAREL, and R. RADMER Nov. 1984 24 p refs

(Contract NCC2-210)

(NASA-CR-166615; NAS 1.26:166615) Avail: NTIS HC A02/MF A01 CSDL 06C

A workshop was conducted to identify the potential problems associated with the use of microalgae in biorregenerative life support systems, and to identify algae related research issues that must be addressed through space flight experimentation. Major questions to be resolved relate to the choice of algal species for inclusion in a bioregenerative life support system, their long term behavior in the space environment, and the nature of the techniques required for the continuous growth of algae on the scale required. Consideration was given to the problems associated with the conversion of algal biomass into edible components. Specific concerns were addressed and alternative transformation processes identified and compared. The workshop identified the following major areas to be addressed by space flight experimentation: (1) long term culture stability, (2) optimal design of algal growth reactors, and (3) post growth harvesting and processing in the space environment. B.W.

**N85-16470\*#** Martin Marietta Labs., Baltimore, Md.  
**ALGAL CULTURE STUDIES RELATED TO A CLOSED ECOLOGICAL LIFE SUPPORT SYSTEM (CELSS)**

R. RADMER, P. BEHRENS, E. FERNANDEZ, O. OLLINGER, C. HOWELL, A. VENABLES, D. HUGGINS, and R. GLADUE Oct. 1984 49 p refs

(Contract NAS2-10969)

(NASA-CR-177322; NAS 1.26:177322) Avail: NTIS HC A03/MF A01 CSDL 06C

In many respects, algae would be the ideal plant component for a biologically based controlled life support system, since they are eminently suited to the closely coupled functions of atmosphere regeneration and food production. *Scenedesmus obliquus* and *Spirulina platensis* were grown in three continuous culture apparatuses. Culture vessels their operation and relative merits are described. Both light and nitrogen utilization efficiency are examined. Long term culture issues are detailed and a discussion of a plasmid search in *Spirulina* is included. B.W.



**N85-16471\*#** Wisconsin Univ., Madison. Dept. of Horticulture.  
**CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM HIGHER PLANT FLIGHT EXPERIMENTS**

T. W. TIBBITTS and R. M. WHEELER Nov. 1984 24 p refs  
 (Contract NCC2-136)  
 (NASA-CR-177323; NAS 1.26:177323) Avail: NTIS HC A02/MF A01 CSCL 06K

Requirements for spaceflight experiments which involve higher plants were determined. The plants are studied for use in controlled ecological life support systems (CELSS). Two categories of research requirements are discussed: (1) the physical needs which include nutrient, water and gas exchange requirements; (2) the biological and physiological functions which affect plants in zero gravity environments. Physical problems studies are given the priority since they affect all biological experiments. E.A.K.

**N85-16472\*#** California Univ., Berkeley. Coll. of Engineering.  
**CONTROL AND MODELING OF A CELSS (CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM)**

D. AUSLANDER, R. SPEAR, P. BABCOCK, and M. NADEL Oct. 1983 85 p refs  
 (Contract NCC2-67)  
 (NASA-CR-177324; NAS 1.26:177324) Avail: NTIS HC A05/MF A01 CSCL 06K

Research topics that arise from the conceptualization of control for closed life support systems which are life support systems in which all or most of the mass is recycled are discussed. Modeling and control of uncertain and poorly defined systems, resource allocation in closed life support systems, and control structures or systems with delay and closure are emphasized. E.A.K.

**N85-16473\*#** Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.

**FEASIBILITY OF PRODUCING A RANGE OF FOOD PRODUCTS FROM A LIMITED RANGE OF UNDIFFERENTIATED MAJOR FOOD COMPONENTS**

M. KAREL and A. R. KAMAREI Apr. 1984 117 p refs  
 (Contract NCC2-231)  
 (NASA-CR-177329; NAS 1.26:177329) Avail: NTIS HC A06/MF A01 CSCL 06H

This report reviews current knowledge associated with producing safe, nutritious, and acceptable foods from a limited number of source independent macronutrients. The advantages, and disadvantages, of such an approach for use by space crews are discussed. The production of macronutrients from a variety of sources is covered in detail. The sources analyzed are: wheat, soybeans, algae (3 genera), glycerol, and digested cellulose. Fabrication of food from the above macronutrient sources is discussed and particular attention is addressed to nutrition, acceptability and reliability. The processes and concepts involved in food fabrication and macronutrient production are also considered for utilization in a space environment. Author

**N85-16474#** Massachusetts Inst. of Tech., Cambridge.  
**INTERACTION OF HUMAN COGNITIVE MODELS AND COMPUTER BASED MODELS IN SUPERVISORY CONTROL**

T. B. SHERIDAN Mar. 1984 38 p  
 (Contract N00014-83-K-0193)  
 (AD-A142547) Avail: NTIS HCA03/MFA01 CSCL 05H

This report summarizes the first year's effort of a three year research systems and how the operators of such systems apparently represent and utilize such knowledge. The first section of the report discusses the relationship of computer based supervisory control to computer based decision aiding (expert systems) by identifying component variables and functions and building up block diagrams. The second section deals quantitatively with internal models, knowledge, and calibration, both with respect to expectations of the existence of identifiable states of the world and with respect to the overlap of meanings of terms (mental) or linguistic encodings, fuzzy variables). The third section discusses mental models and their importance in three kinds of activities supervisors must do in complex systems: (1) discovering how things work; (2) determining what is wanted out of the set of alternatives

states of the attributes; (3) encoding and manipulating fuzzy concepts; (4) combining evidence and confidence; (5) deciding what to do. The fourth section of the report deals with the human use of computer based models in automatic control and in decision aiding. It reports on three sets of experiments underway or completed. GRA

**N85-16475#** Human Resources Research Organization, Alexandria, Va.

**HUMAN FACTORS AND TRAINING RESEARCH IN MILITARY ORGANIZATIONS AND SYSTEMS Final Report**

A. L. KUBALA Army Research Inst. for Behavioral and Social Sciences Oct. 1984 13 p  
 (Contract MDA903-79-C-0191; DA PROJ. 2Q2-62717-A-765; DA PROJ. 2Q2-62731-A-792)  
 (AD-A146832; HUMRRO-FR-MTRD(TX)-80-9; ARI-RN-84-124)  
 Avail: NTIS HC A02/MF A01 CSCL 05I

This report summarizes the resulting five research projects conducted between March 1979 and February 1980. Separate, more detailed reports describing the work in each of the five areas are being published concurrently. These reports are: 'Preliminary Development of the Commander's Unit Analysis Profile: A Leadership Tool for the Small Military Unit; The Impact of Adopting Physical Fitness Standards on Army Personnel Assignment: A Preliminary Study; Testing and Training Methods for Skill Qualification Testing; Reading Ability and Other Correlates of the SQT Written Component; Development of a Basic Training Program in Combat Vehicle Identification; and Improvement of Training Realism for Tactical Units: Opposing Force (OPFOR) Program. GRA

**N85-16476#** Human Resources Research Organization, Alexandria, Va.

**HUMAN FACTORS CHARACTERISTICS OF THE JOINT TACTICAL FUSION TEST BED: FIELD TEST 467 RESULTS**

P. T. MARSTON, A. L. KUBALA, and E. R. SMOOTZ Oct. 1984 45 p  
 (Contract MDA903-79-C-0191; DA PROJ. 2Q2-63743-A-794)  
 (AD-A146856; HUMRRO-FR-MTRD(TX)-82-22; ARI-RN-84-125)  
 Avail: NTIS HC A03/MF A01 CSCL 05E

This report describes an analysis of the human factors characteristics of the Joint Tactical Fusion Test Bed-Army (JTFTB-A). Data were obtained from interviews, questionnaires, direct observation and physical measurements of the operator stations and environmental factors. An attempt was made to relate the findings to anticipated requirements for an All Source Analysis System (ASAS) for intelligence data. Operators gave high ratings to the large majority of the individual functions the system could perform. However, four functions were rated poorly because operators felt performance time was excessive and procedures were overly tedious. GRA

**N85-16477#** School of Aerospace Medicine, Brooks AFB, Tex.  
**HUMAN FACTORS SURVEY: C-5 PILOTS Final Report, Sep. 1982 - Mar. 1983**

J. S. MAJOR Sep. 1984 22 p  
 (AD-A147106; USAFSAM-TR-84-26) Avail: NTIS HC A02/MF A01 CSCL 05I

The purpose of this study was to conduct a broad preliminary human-factors survey of MAC C-5 pilots. Questionnaire and interview data were collected from 34 C-5 pilots (volunteers), with anonymity guaranteed. Study results are grouped under demographic, mission, physical, physiological, psychological, psychosocial, and pathological categories. Potential human-factors problem areas within the C-5 pilot population are suggested by the sample-group findings. The chronic problem of airlift-crew fatigue is apparent. Nearly 56% of the survey pilots reported significant levels of fatigue during a typical leg of their most recent strategic airlift missions. Also, a majority of them indicated various problems (probably fatigue related) with attention--such as distractions during critical phases of flight, boredom/complacency during the cruise portion, and fixated/channelized attention. Many pilots reported life-event changes and stresses--including a variety

of family/marital problems, recent separation/divorce, financial crisis, nonselection for promotion, and other career dissatisfactions. A significant portion of the pilots reported difficulties (again, possibly fatigue related) involving procedural recall, instrument cross-check, radio calls, missed checklist items, task saturation, and flying proficiency in general during the reference flight. The findings, including interrelationships, are discussed. These results appear consistent with reports being submitted by crewmembers to the HQ MAC/IGFF Accident Waiting to Happen (AWTH) near-mishap reporting program. The findings of this study are recommended for use by MAC's operational planners and managers. GRA

**N85-16478#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

**AN ANALYSIS OF CONSTRAINTS TO COORDINATED TACTICAL CREW INTERACTION IN THE P-3C AIRCRAFT M.S. Thesis**

J. E. JONES Sep. 1984 95 p  
(AD-A147220; AFIT/GLM/LSM/84S-32) Avail: NTIS HC A05/MF A01 CSCL 05J

The P-3C long range maritime patrol aircraft has evolved over the past thirty years into a very complex, multi-sensor weapons system platform. Increased effectiveness has been achieved by incorporating systems that rapidly process large amounts of data. However, crew members operate within relatively fixed, cognitive limitations. Mission tasks are divided among the crew members who must work together to monitor, assess and control these complex information processing systems. Little emphasis has been placed on enhancing team performance through better communication and coordination among the team members. This research effort provides an exploratory study of factors which impact team performance. Areas analyzed include current P-3C human factors, deficiencies that inhibit group interaction, a review of communication and group interaction literature relevant to the P-3C aircrew team environment, and an analysis of tactical crew station arrangement, and an analysis of tactical crew station arrangements in allied maritime patrol aircraft. GRA

**N85-16479#** Pattern Analysis and Recognition Corp., McLean, Va.

**MENTAL MODELS AND COOPERATIVE PROBLEM SOLVING WITH EXPERT SYSTEMS**

P. E. LEHNER, F. W. ROOK, and L. ADELMAN Sep. 1984 48 p  
(Contract N00014-83-C-0537)  
(AD-A147843; PAR-84-116) Avail: NTIS HC A03/MF A01 CSCL 05H

A cognitive theory of user/expert system interaction is proposed that relates the quality of cooperative problem solving with an expert system to: (1) cognitive consistency--the degree of consistency between the rule-based system and the user's problem solving processes; and (2) mental model--the user's conceptual understanding of the basic principle of the system's problem solving processes. An experimental study is described that strongly supports the theoretical prediction. In particular, the results support the prediction that for users with an accurate mental model, increasing cognitive consistency significantly decreases user/expert system problem solving performance. Users not processing an accurate mental model reach higher performance when utilizing cognitive consistent procedures. The practical implications of this theory are briefly discussed. Originator-supplied keywords include: Human factors, and Man/machine interface. GRA

**N85-16894\*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**MAN-MACHINE INTERFACE AND CONTROL OF THE SHUTTLE DIGITAL FLIGHT SYSTEM**

R. D. BURGHDOFF and J. L. LEWIS, JR. *In its* Space Shuttle Tech. Conf., Pt. 1 p 47-53 Jan. 1985  
Avail: NTIS HC A25/MF A01 CSCL 05H

The space shuttle main engine (SSME) presented new requirements in the design of controls for large pump fed liquid rocket engine systems. These requirements were the need for

built in full mission support capability, and complexity and flexibility of function not previously needed in this type of application. An engine mounted programmable digital control system was developed to meet these requirements. The engine system and controller and their function are described. Design challenges encountered during the course of development included accommodation for a very severe engine environment, the implementation of redundancy and redundancy management to provide fail operational/fail safe capability, removal of heat from the package, and significant constraints on computer memory size and processing time. The flexibility offered by programmable control reshaped the approach to engine design and development and set the pattern for future controls development in these types of applications. Author

**N85-16897\*#** International Business Machines Corp., Cape Canaveral, Fla.

**GROUND MAN-MACHINE INTERFACES FOR ORBITER CHECKOUT**

F. H. BLACKMON *In* NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 p 76-80 Jan. 1985  
Avail: NTIS HC A25/MF A01 CSCL 05H

The challenge of the concept of a reusable, cargo carrying space vehicle, and how those challenges were met for the Space Shuttle are discussed. The complexity of the vehicle, the ground support system, the onboard computer system, ramifications of a reusable vehicle, and the turn around objectives for Shuttle flights are outlined. The Apollo and the space transportation system (STS) are compared. E.A.K.

**N85-16921\*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**CHALLENGES OF DEVELOPING AN ELECTRO-OPTICAL SYSTEM FOR MEASURING MAN'S OPERATIONAL ENVELOPE**

B. WOOLFORD *In its* Space Shuttle Tech. Conf., Pt. 1 p 426-434 Jan. 1985 refs  
Avail: NTIS HC A25/MF A01 CSCL 05H

In designing work stations and restraint systems, and in planning tasks to be performed in space, a knowledge of the capabilities of the operator is essential. Answers to such questions as whether a specific control or work surface can be reached from a given restraint and how much force can be applied are of particular interest. A computer-aided design system has been developed for designing and evaluating work stations, etc., and the Anthropometric Measurement Laboratory (AML) has been charged with obtaining the data to be used in design and modeling. Traditional methods of measuring reach and force are very labor intensive and require bulky equipment. The AML has developed a series of electro-optical devices for collecting reach data easily, in computer readable form, with portable systems. The systems developed, their use, and data collected with them are described. Author

**N85-16922\*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

**CHALLENGES IN THE DEVELOPMENT OF THE SHUTTLE EXTRAVEHICULAR MOBILITY UNIT**

H. J. MCMANN and J. W. MCBARRON, II *In its* Space Shuttle Tech. Conf., Pt. 1 p 435-449 Jan. 1985 refs  
Avail: NTIS HC A25/MF A01 CSCL 05H

The development of the Shuttle extravehicular mobility unit (EMU) has required significant technology advances in the design of the astronaut life support system and space-suit assembly. The life support system and space-suit assemblies are integrated into a single system and optimized for the primary function of supporting astronaut extravehicular operations. Rather than accommodating a limited, male-only astronaut population, the EMU must satisfy size requirements for both males and females with a minimum of sized parts. In addition, the Shuttle EMU has been designed to implement Space Shuttle Program philosophy of long operating life and mission reuse capability to minimize program lifetime cost. The advancement in life support system and space-suit technology achieved by the development of the Shuttle extravehicular mobility



unit (EMU) is illustrated by comparison with the requirements for and the design features of the Apollo EMU. B.W.

**N85-16923\*#** Hamilton Standard, Windsor Locks, Conn.  
**CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ACTIVE THERMAL CONTROL SUBSYSTEM**

J. R. NASON, F. A. WIERUM (Rice Univ., Houston, Tex.), and J. L. YANOSY /in NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 p 450-464 Jan. 1985 refs  
 Avail: NTIS HC A25/MF A01 CSCL 06K

A number of major challenges were faced in the design and development of the Orbiter Active Thermal Control Subsystem (ATCS). At the system level, the initial challenges were to define an approach that would interface dual Freon coolant loops with multiple coolant loops from other vehicle subsystems with the lowest weight penalty to the Orbiter; and to provide highly responsive vehicle heat rejection throughout all of the Orbiter mission phases. Optimized heat exchangers, representing an advance in the state-of-the-art in heat exchanger design, were developed to transfer heat between the orbiter Freon coolant loops and five other vehicle systems. Flash evaporation was selected as a highly efficient and responsive means for cooling the Orbiter Freon loops during ascent and entry. The Flash Evaporator Subsystem (FES) utilizes cyclic water spray cooling in a chamber maintained at or below the water triple point pressure. A summary of the basic heat transfer research conducted to identify the fundamental heat transfer processes involved in water spray cooling in support of the FES design is given. The high fidelity dynamic analytical model of the FES that was generated to aid in the design of control logic, evaluate performance and simulate ground test and flight anomalies is discussed. A description of the FES and Integrated ATCS testing conducted in the SESL chamber A at NASA-JSC is also presented. B.W.

**N85-16924\*#** Rockwell International Corp., Downey, Calif.  
**OTHER CHALLENGES IN THE DEVELOPMENT OF THE ORBITER ENVIRONMENTAL CONTROL HARDWARE**

J. W. GIBB, M. E. MCINTOSH, S. R. HEINRICH (Fairchild Control Systems Co., Manhattan Beach, Calif.), E. THOMAS (Brunswick Corp., Costa Mesa, Calif.), M. STEELE (Brunswick Corp., Costa Mesa, Calif.), F. SCHUBERT (Life Systems, Inc., Cleveland, Ohio), E. P. KOSZENSKI (Life Systems, Inc., Cleveland, Ohio), R. A. WYNVEEN (Life Systems, Inc., Cleveland, Ohio), R. W. MURRAY (General Electric Co., Valley Forge, Pa.), J. D. SCHELKOPF (General Electric Co., Valley Forge, Pa.) et al. /in NASA. Johnson Space Center Space Shuttle Tech. Conf., Pt. 1 p 465-479 Jan. 1985  
 Avail: NTIS HC A25/MF A01 CSCL 06K

Development of the Space Shuttle orbiter environmental control and life support system (ECLSS) included the identification and resolution of several interesting problems in several systems. Some of these problems occurred late in the program, including the flight phase. Problems and solutions related to the ammonia boiler system (ABS), smoke detector, water/hydrogen separator, and waste collector system (WCS) are addressed. B.W.

**N85-17546\*#** General Electric Co., Houston, Tex. Space Systems Div.

**DESIGN CONCEPT DEFINITION STUDY FOR AN IMPROVED SHUTTLE WASTE COLLECTION SUBSYSTEM Final Report**

30 Nov. 1984 326 p  
 (Contract NAS9-17182)  
 (NASA-CR-171834; NAS 1.26:171834) Avail: NTIS HC A15/MF A01 CSCL 06K

A no-risk approach for developing an Improved Waste Collection Subsystem (WCS) for the shuttle orbiter is described. The GE Improved WCS Concept builds on the experience of 14 Shuttle missions with over 400 man-days of service. This concept employs the methods of the existing flight-proven mature design, augmenting them to eliminate foreseen difficulties and to fully comply with the design requirements. The GE Improved WCS Concept includes separate storage for used wipes. Compaction of the wipes provides a solution to the capacity problem, fully satisfying the 210 man-day

storage requirement. The added feature of in-flight serviceable storage space for the wipes creates a variable capacity feature which affords redundancy in the event of wipes compaction system failure. Addition of features permitting in-flight servicing of the feces storage tank creates a variable capacity WCS with easier post-flight servicing to support rapid turnaround of the Shuttle orbiter. When these features are combined with a vacuum pump to evacuate wipes and fecal storage tanks through replaceable odor/bacteria filters to the cabin, the GE Improved WCS satisfies the known requirements for Space Station use, including no venting to space. B.W.

**N85-17547\*#** Springborn Labs., Inc., Enfield, Conn.  
**PROTOTYPE WASH WATER RENOVATION SYSTEM INTEGRATION WITH GOVERNMENT-FURNISHED WASH FIXTURE Final Report, 1 Oct. 1983 - 30 Sep. 1984**

30 Sep. 1984 88 p refs  
 (Contract NAS9-17004)  
 (NASA-CR-171829; NAS 1.26:171829) Avail: NTIS HC A05/MF A01 CSCL 06K

The requirements of a significant quantity of proposed life sciences experiments in Shuttle payloads for available wash water to support cleansing operations has provided the incentive to develop a technique for wash water renovation. A prototype wash water waste renovation system which has the capability to process the waste water and return it to a state adequate for reuse in a typical cleansing fixture designed to support life science experiments was investigated. The resulting technology is to support other developments efforts pertaining to water reclamation by serving as a pretreatment step for subsequent reclamation procedures. R.S.F.

**N85-17548\*#** McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

**IMPROVED ORBITER WASTE COLLECTION SYSTEM STUDY Final Report**

P. H. BASTIN 16 Nov. 1984 143 p refs  
 (Contract NAS9-17181)  
 (NASA-CR-171830; NAS 1.26:171830; MDC-H1360) Avail: NTIS HC A07/MF A01 CSCL 06K

Design concepts for improved fecal waste collection both on the space shuttle orbiter and as a precursor for the space station are discussed. Inflight usage problems associated with the existing orbiter waste collection subsystem are considered. A basis was sought for the selection of an optimum waste collection system concept which may ultimately result in the development of an orbiter flight test article for concept verification and subsequent production of new flight hardware. Two concepts were selected for orbiter and are shown in detail. Additionally, one concept selected for application to the space station is presented. R.S.F.

**N85-17549\*#** McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

**IMPROVED ORBITER WASTE COLLECTION SYSTEM STUDY, APPENDIX D Final Report**

Nov. 1984 24 p refs  
 (Contract NAS9-17181)  
 (NASA-CR-171833; NAS 1.26:171833; MDC-H1360-APP-D)  
 Avail: NTIS HC A02/MF A01 CSCL 06K

Basic requirements for a space shuttle orbiter waste collection system are established. They are intended to be an aid in the development and procurement of a representative flight test article. Orbiter interface requirements, performance requirements, flight crew operational requirements, flight-environmental requirements, and ground operational and environmental requirements are considered. R.S.F.

**N85-17550\*#** National Aeronautics and Space Administration, Langley Research Center, Hampton, Va.  
**COMPUTER SUBROUTINES FOR ESTIMATION OF HUMAN EXPOSURE TO RADIATION IN LOW EARTH ORBIT**  
 F. A. CUCINOTTA (Old Dominion Univ., Norfolk, Va.) and J. W. WILSON Feb. 1985 26 p refs  
 (NASA-TM-86324; L-15865; NAS 1.15:86324) Avail: NTIS HC A03/MF A01 CSCL 06R

Computer subroutines to calculate human exposure to trapped radiations in low Earth orbit (LEO) on the basis of a simple approximation of the human geometry by spherical shell shields of varying thickness are presented and detailed. The subroutines calculate the dose to critical body organs and the fraction of exposure limit reached as a function of altitude of orbit, degree of inclination, shield thickness, and days in mission. Exposure rates are compared with current exposure limits. Author

**N85-17551\*#** Houston Univ., Tex. Dept. of Mechanical Engineering.  
**CHARACTERIZATION OF HEAT TRANSFER IN NUTRIENT MATERIALS Final Report, 30 Apr. 1971 - 31 Dec. 1984**  
 L. C. WITTE 7 Jan. 1985 6 p  
 (Contract NAS2-11676)  
 (NASA-CR-171841; NAS 1.26:171841) Avail: NTIS HC A02/MF A01 CSCL 06H

The processing and storage of foodstuffs in zero-g environments such as in Skylab and the space shuttle were investigated. Particular attention was given to the efficient heating of foodstuffs. The thermophysical properties of various foods were cataloged and critiqued. The low temperature storage of biological samples as well as foodstuffs during shuttle flights was studied. Research and development requirements related to food preparation and storage on the space station are discussed. R.S.F.

**N85-17552\*#** Hamilton Standard, Windsor Locks, Conn.  
**WASTE COLLECTION SUBSYSTEM STUDY Final Report**  
 Dec. 1984 125 p  
 (Contract NAS9-17183)  
 (NASA-CR-171836; NAS 1.26:171836; SVHSER-8931) Avail: NTIS HC A06/MF A01 CSCL 06K

Practical ways were explored of improving waste compaction and of providing rapid turnaround between flights at essentially no cost for the space shuttle waste collection subsystem commode. Because of the possible application of a fully developed shuttle commode to the space station, means of providing waste treatment without overboard venting were also considered. Three basic schemes for compaction and rapid turnaround, each fully capable of meeting the objectives, were explored in sufficient depth to bring out the characteristic advantages and disadvantages of each. Tradeoff comparisons were very close between leading contenders and efforts were made to refine the design concepts sufficiently to justify a selection. The concept selected makes use of a sealed canister containing wastes that have been forcibly compacted, which is removable in flight. No selection was made between three superior non-venting treatment methods owing to the need for experimental evaluations of the processes involved. A system requirements definition document has been prepared to define the task for a test embodiment of the selected concept. R.S.F.

**N85-17553\*#** Fairchild Republic Co., Farmingdale, N. Y.  
**SPACE SHUTTLE ORBITER WASTE COLLECTION SYSTEM CONCEPTUAL STUDY Final Report**  
 M. ABBATE 18 Jan. 1985 142 p  
 (Contract NAS9-17223)  
 (NASA-CR-171844; NAS 1.26:171844; MS254V1003) Avail: NTIS HC A07/MF A01 CSCL 06K

The analyses and studies conducted to develop a recommended design concept for a new fecal collection system that can be retrofitted into the space shuttle vehicle to replace the existing troublesome system which has had limited success in use are summarized. The concept selected is a cartridge compactor fecal collection subsystem which utilizes an airflow collection mode combined with a mechanical compaction and vacuum drying mode

that satisfies the shuttle requirements with respect to size, weight, interfaces, and crew comments. A follow-on development program is recommended which is to result in flight test hardware retrofittable on a shuttle vehicle. This permits NASA to evaluate the system which has space station applicability before committing production funds for the shuttle fleet and space station development.

R.S.F.

**N85-17554#** North Carolina Agricultural and Technical State Univ., Greensboro. Dept. of Industrial Engineering.  
**A COMPUTER AIDED MULTI-MAN-MACHINE WORK AREA DESIGN AND EVALUATION SYSTEM (MAWADES) Final Report**  
 B. M. PULAT Aug. 1984 77 p  
 (Contract N00014-81-C-0320)  
 (AD-A147950) Avail: NTIS HC A05/MF A01 CSCL 05E

MAWADES is a computerized design tool for a human factors specialist. It has been developed for designing the work-space of a crew for command, communications, and control activities at sit-stand duty. The first module in the MAWADES model is WOSTAS. Workstation Assessor (WOSTAS) accepts mission oriented task requirements, and using scheduling and line balancing concepts, generates alternate scheduling schemes of tasks to workstations. Then the WORG (Work-space Organizer) module generates ergonomically sound layouts of the workstations within the work-space. Workstations are laid out according to calculated link values between them. The third module is WOLAG (Workstation Layout Generator) which has been designed to generate panel layouts at each workstation. Displays and controls are laid out sequentially on a panel based on system functions and operational relationships between panel components. An existing model, SAINT (System Analysis of Integrated Network of Tasks), is used for dynamic evaluation of suggested alternative designs. Other evaluation criteria (static) applied through the first three modules also help in the decision making process. GRA

**N85-17555#** SRI International Corp., Menlo Park, Calif.  
**SPATIOTEMPORAL CHARACTERISTICS OF VISUAL LOCALIZATION Annual Report, 30 Sep. 1983 - 29 Sep. 1984**  
 C. A. BURBECK Jul. 1984 7 p  
 (Contract F49620-82-K-0024)  
 (AD-A148013; AFOSR-84-1068TR) Avail: NTIS HC A02/MF A01 CSCL 05J

We continue to study the spatial and temporal characteristics of relative spatial localization, seeking to establish conditions in which it can be isolated from the processes underlying the detection of motion and form. Thus far we have found that stabilizing the retinal image degrades localization accuracy by a factor of 2, and further that this degradation does not result from a reduction in the apparent contrast of the stimulus. Drifting the stimulus slowly at a velocity known to restore contrast sensitivity to normal (unstabilized) values does not improve localization accuracy noticeably. However, localization accuracy is restored to normal if the otherwise-stabilized stimulus is moved rapidly. We have also found that localization accuracy improves with increasing contrast for contrasts significantly above the detection threshold, supporting our hypothesis that location and detection are parallel visual processes. We have also found that localization accuracy is as good at large object separations as it is at very small separations (the vernier acuity range where sensitivity is known to be extremely acute). Thus, spatial localization is not primarily a foveal function that is degraded elsewhere, but rather a general visual ability. GRA

**N85-17556#** Naval Health Research Center, San Diego, Calif.  
**COGNITIVE PERFORMANCE DURING SUCCESSIVE SUSTAINED PHYSICAL WORK EPISODES Interim Report**  
 C. E. ENGLUND, D. H. RYMAN, P. NAITOH, and J. A. HODGDON Jul. 1984 30 p  
 (AD-A148061; NAVHLTHRSCHC-84-31) Avail: NTIS HC A03/MF A01 CSCL 05J

During times of emergency, e.g., military operations, humans must often work continuously for long hours at physically

demanding tasks while remaining mentally alert. In this repeated measures study, eleven pairs (one experimental and one control) of Marines (N=22) experienced one 12-hour baseline and two 20-hour continuous work episodes (CWE). The 20-hour CWEs were separated by five hours which included a 3-hour nap from 0400-0700. Each hour of CWE was split into two half-hour sessions. During the first half-hour subjects performed alpha-numeric (A-N) visual vigilance tasks. The experimental member of each pair spent this first 30 minutes also walking on a treadmill in full combat gear (25 kg) at approximately 30 percent max V02 heart rate for a total distance of approximately 114 km. The controls performed the A-N task sitting quietly at a video terminal. During the second half-hour, all subjects performed selected combinations of computer generated tasks. The results indicated that the exercise of treadmill walking did not accentuate sleep loss effects on the cognitive measures studied. Sleep loss (day differences) was significant for the visual vigilance task (CWI = 80.9%, correct CW2 = 70.6%).

GRA

**N85-17557#** Navy Experimental Diving Unit, Panama City, Fla.  
**OPERATING AND MAINTENANCE GUIDELINES FOR THE KINERGETICS (TRADE NAME) ENVIRONMENTAL CONTROL SYSTEM. CARBON DIOXIDE SCRUBBER MODEL DH-10 AND HEAT EXCHANGER MODEL CCU-01** Final Report

H. J. C. SCHWARTZ May 1984 18 p  
(AD-A148107; NEDU-14-84) Avail: NTIS HC A02/MF A01  
CSCL 13I

An environmental control system consisting of carbon dioxide scrubber model DH-10 and heat exchange model CCU-01 has previously been evaluated as suitable for installation in standard U.S. Navy two-lock aluminum recompression chambers. This report provides installation and operating guidelines and may be used as a basis for writing operating procedures for the two units. Manufacturer's instructions should be followed for installation. A method of measuring chamber carbon dioxide concentration, such as chemical detection tubes, must be used to determine when to change carbon dioxide absorbent canisters. For planning purposes, predicted canister durations for the scrubber under specified conditions of 3 occupants or less, 75 deg F (24 C) internal temperature, and no external ventilation or breathing apparatus overboard dump are 3.5 hours at 30 Feet of Sea Water (FSW), 1.5 hours at 60 FSW, and 1.0 hour at 165 FSW. The heat exchanger requires a minimum of 2 gallons per minute of water or water/propylene glycol mixture, chilled to a maximum temperature at the chamber ranging from 82 deg F (28 deg C) for an ambient air temperature of 86 deg F (30 deg C), to 36 deg F (2 deg C) for an ambient air temperature of 110 deg F (43 deg C), in order to keep the chamber internal temperature below 85 deg F (30 deg C).

GRA

**N85-17558#** Naval Postgraduate School, Monterey, Calif.  
**DESIGN OF AN EVALUATION SYSTEM TO MEASURE PERFORMANCE DEGRADATION DUE TO CONTINUOUS OPERATIONS M.S. Thesis**

M. G. O'DONNELL Mar. 1984 119 p  
(AD-A148188) Avail: NTIS HC A06/MF A01 CSCL 05J

This thesis establishes guidelines for an evaluation system designed to measure performance degradation due to continuous operations for battalion-sized units of the United States Army. It serves to initiate direction for the evaluation system, provides the framework on how to accomplish the necessary data measurements for such an evaluation, and enumerates the performance indicators to be measured. Techniques to analyze different types of data are provided, along with examples of the use of those techniques. A discussion of the uses of the analysis results is also presented.

Author (GRA)

**N85-17559#** Duke Univ., Durham, N. C. Lab. for Environmental Research.

**A THEORETICAL METHOD FOR SELECTING SPACE CRAFT AND SPACE SUIT ATMOSPHERES**

R. D. VANN and J. R. TORRE-BUENO 1984 25 p

(Contract N00014-83-K-0019)

(AD-A148219) Avail: NTIS HC A02/MF A01 CSCL 06K

A theoretical method for selecting space craft and space suit atmospheres is described. The method assumes that gas bubbles cause decompression sickness and that the risk increases when a critical bubble volume is exceeded. The method is consistent with empirical decompression exposures for humans under conditions of nitrogen equilibrium between the lungs and tissues. Space station atmospheres are selected so that flight crews may decompress immediately from sea level to station pressure without preoxygenation. Bubbles form as a result of this decompression but are less than the critical volume. The bubbles are absorbed during an equilibrium period after which immediate transition to suit pressure is possible. Exercise after decompression and incomplete nitrogen equilibrium are shown to increase bubble size, and these factors limit the usefulness of one previously tested stage decompression procedure for the Shuttle. The method might be helpful for evaluating decompression procedures before testing.

GRA

**N85-17560#** Navy Experimental Diving Unit, Panama City, Fla.  
**MANNED TESTING OF TWO CLOSED-CIRCUIT OXYGEN UNDERWATER BREATHING APPARATUS: US NAVY EMERSON RIG AND FENZY PO.68** Final Report

H. J. C. SCHWARTZ Sep. 1984 22 p  
(AD-A148300; NEDU-13-84) Avail: NTIS HC A02/MF A01  
CSCL 06K

The breathing characteristics of two types of closed circuit oxygen Self-Contained Underwater Breathing Apparatus (SCUBA), at a pressure equivalent to 30 feet of sea water were studied in the Ocean Simulation Facility of the Navy Experimental Diving Unit. Breath-by-breath curves of inhaled and exhaled oxygen and carbon dioxide levels and inspiratory/expiratory pressure curves were recorded. For the first type, the U.S. Navy Recirculating Underwater Breathing Apparatus, Closed-Circuit, Oxygen (Emerson Rig), the carbon dioxide absorbent canister duration at 70 deg F (21 deg C) exceeded the arbitrary cutoff of 240 minutes with diver-subjects doing moderate work; at 40 deg F (4 deg C) the canister duration was 199 minutes. For the second type, the Fenzy PO.68, the canister duration at 70 deg F (21 deg C) was 95 minutes, and no studies were done at 40 deg F. Both types were able to support divers doing hard work. Five cases of oxygen toxicity were seen, including three divers with mild symptoms, one with a near-convulsion, and one with a convulsion.

GRA

**N85-17561#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**DEVELOPMENT OF AN ELECTRO-PNEUMATIC ANTI-G VALVE FOR HIGH PERFORMANCE FIGHTER AIRCRAFT**

R. E. VANPATTEN, T. J. JENNINGS, W. ALBERY, J. W. FRAZIER, and C. GOODYEAR 13 Dec. 1984 12 p Presented at the 1984 SAFE Symposium, Las Vegas, NV, 9-13 Dec. 1984

(AD-A148468; AFAMRL-TR-84-066) Avail: NTIS HC A02/MF A01 CSCL 06Q

A new concept for an anti-G suit valve was designed and built. The valve is designed specifically to protect aircrew from the unique physiological hazard of high onset rate, high sustained acceleration. The design is a hybridization of a conventional inertially operated valve and uses an electronically controlled solenoid to drive the anti-G suit pressure to the maximum when the level of acceleration exceeds both +2Gz and an onset rate of 2G/sec. After a 1.5 sec period the valve reverts to inertial operation unless the trigger criteria are fulfilled again. Relaxed tolerance of 15 human subjects was determined under high rate of onset centrifuge testing of the new valve (with and without ready pressure) versus the standard valve and a high flow ready pressure valve. The new concept provides a 1G improvement over the standard valve, and a 0.5 G improvement over the high

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flow ready pressure valve. On the basis of published data taken under similar conditions, the new valve appears to provide a 0.5 G improvement over all electronic servo valves. Pilot acceptance of this rapid acting concept has been favorable. GRA

**N85-17562#** Army Aeromedical Research Lab., Fort Rucker, Ala.

### **SPH-4 US ARMY FLIGHT HELMET PERFORMANCE, 1972 - 1983**

T. E. READING, J. L. HALEY, JR., A. C. SIPPO, J. R. LICINA, and A. W. SCHOPPER Nov. 1984 49 p  
(Contract DA PROJ. 3E1-62777-A-878)  
(AD-A148674; USAARL-85-1) Avail: NTIS HC A03/MF A01  
CSCL 06Q

Injury data was obtained from the US Army Safety Center for the occupants of US Army aircraft who were both wearing aviator helmets and involved in duty related aircraft accidents from the period beginning on 1 January 1972 and ending on 31 December 1982. The injury data was correlated with the physical condition of the helmets involved which has been obtained by the US Army Aeromedical Research Laboratory under the Aviation Life Support Equipment Retrieval Program. The helmet performance was evaluated with regard to current injury prevention capabilities and potential improvements for future helmet designs. For consistency, only the 208 SPH-4s in the data base were fully analyzed. An appendix contains a limited analysis of the APH-5s performance. It should be emphasized that no combat damaged helmets are discussed or analyzed in this report: i.e., no shrapnel or bullet damage is covered. GRA

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### **PLANETARY BIOLOGY**

Includes exobiology; and extraterrestrial life.

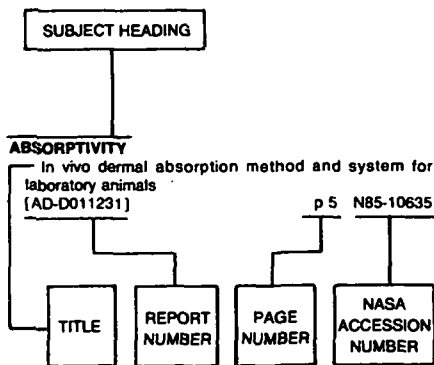
**A85-20021**

### **CAN PHYSICS HELP TO UNDERSTAND HOW LIFE AROSE? [POMOZHET LI FIZIKA PONIAT', KAK VOZNIKLA ZHIZN'?)**

L. L. MOROZOV Priroda (ISSN 0032-874X), Dec. 1984, p. 35-48.  
In Russian. refs

The chirality of organic compounds is examined with reference to the problem of the origin of the chiral purity of the biosphere. It is concluded that the appearance of a biosphere of chiral purity from an originally racemic mixture of optical antipodes in prebiological chemistry (i.e., the appearance of life in nonliving nature) occurred as a kind of phase transition: a favorable catastrophe. By analogy with cosmology, this transition can be termed a biological big bang. L.M.

## Typical Subject Index Listing



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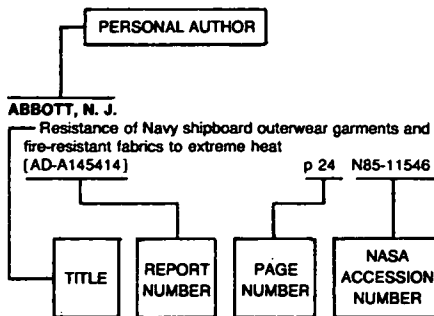
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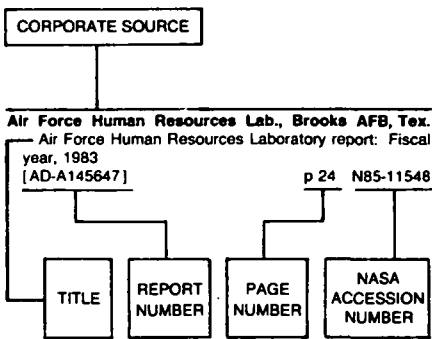
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MAY 1985

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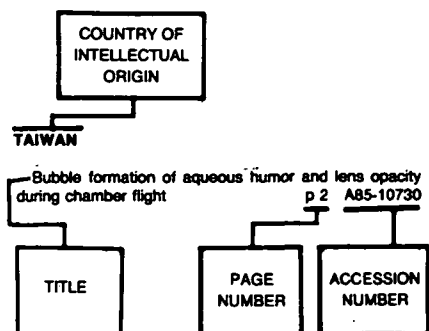
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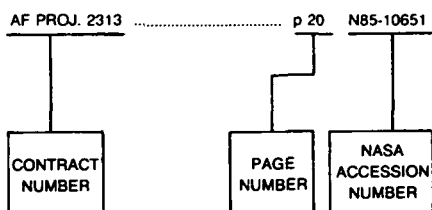


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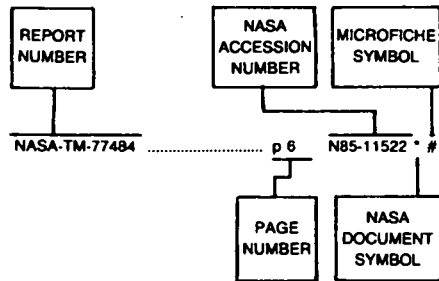
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AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Supplement 271)

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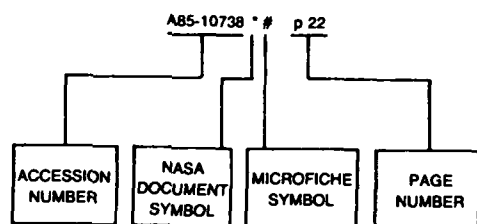
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1. Report No. NASA SP-7011 (271)	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Aerospace Medicine and Biology Continuing Bibliography (Supplement 271)		5. Report Date May, 1985	
		6. Performing Organization Code	
7. Author(s)		8. Performing Organization Report No.	
9. Performing Organization Name and Address National Aeronautics and Space Administration Washington, DC 20546		10. Work Unit No.	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address		13. Type of Report and Period Covered	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract  <p style="text-align: center;">This bibliography lists 421 reports, articles and other documents introduced into the NASA scientific and technical information system in April 1985.</p>			
17. Key Words (Suggested by Author(s))  Aerospace Medicine Bibliographies Biological Effects		18. Distribution Statement  Unclassified - Unlimited	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 124	22. Price* \$7.00 HC

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